Dell® PowerEdge® 4300 Systems

SERVICE MANUAL

www.dell.com

Information in this document is subject to change without notice.
© 1998 Dell Computer Corporation. All rights reserved.

Reproduction in any manner whatsoever without the written permission of Dell Computer Corporation is strictly forbidden.

Trademarks used in this text: *Dell*, the *DELL* logo, and *PowerEdge* are registered trademarks and *Dell OpenManage* is a trademark of Dell Computer Corporation; *IBM* is a registered trademark of International Business Machines Corporation; *Intel* and *Pentium* are registered trademarks and *MMX* is a trademark of Intel Corporation.

Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Dell Computer Corporation disclaims any proprietary interest in trademarks and trade names other than its own.

September 1998 P/N 33667

Contents

Chapter 1 System Overview 1-1

System Features 1-1
- Accessing the Interior of the System 1-6
- System Memory 1-7
- Advanced Expansion Subsystems 1-8
- Video Controller 1-8
- Integrated SCSI Controllers 1-8
- SCSI Hard-Disk Drives 1-8
- SCSI Configuration Guidelines 1-9
  - SCSI ID Numbers 1-9
  - Device Termination 1-9
- PSPB and System Power Supplies 1-9
  - System Power Supplies 1-10
  - PSPB 1-10
  - Pin Assignments for the PSPB Power Connectors 1-12
- System Board Layout 1-15
- SCSI Backplane Board Layouts 1-16
- System Board Jumpers 1-17
- Interrupt Assignments 1-18
- DMA Channel Assignments 1-19

Technical Specifications 1-20

Chapter 2 Basic Troubleshooting 2-1

Initial User Contact 2-1
External Visual Inspection 2-2
Observing the Boot Routine 2-3
Internal Visual Inspection 2-5
Eliminating Resource Conflicts 2-6
Running the Dell Diagnostics 2-6
Getting Help 2-7

Chapter 3 Codes and Messages 3-1

POST Beep Codes 3-1
System Messages 3-5
Alert Messages From Dell OpenManage HIP 3-13
SCSI Hard-Disk Drive Indicator Codes 3-17

Chapter 4 Removing and Replacing Parts 4-1

Recommended Tools 4-1
Precautionary Measures 4-2
Computer Cover 4-3
Front Bezel 4-4
Control Panel Assembly 4-5
Drives 4-6
Externally Accessible Drives 4-7
Front-Panel Inserts 4-7
Close-Out Panels 4-7
Reorienting the External Drive Cage 4-8
5.25- and 3.5-Inch Drives 4-9
Hard-Disk Drives in External Bay 4-11
Hard-Disk Drives 4-12
SCSI Backplane Board 4-14
System Power Supply 4-16
System Power Supply and PSPB Upgrade 4-17
Power-Supply Paralleling Board 4-21
System Cooling Fans 4-22
Three-Fan Assembly 4-23
Fan Power-Cable Bundle 4-24
Drive Fan 4-24
System Board Fans 4-25
System Board Components 4-26
Expansion Cards 4-27
Interior Support Panel 4-29
DIMMs 4-30
SEC Cartridge and Heat Sink Assembly 4-31
Terminator Card 4-33
System Battery 4-34
System Board Assembly 4-35
System Board 4-36
Guide Bracket Assembly 4-37

Appendix A System Setup Program A-1

System Setup Screens A-2

Index

Figures

Figure 1-1. Computer Orientation 1-3
Figure 1-2. Front-Panel Features 1-4
Figure 1-3. Back-Panel Features 1-4
Figure 1-4. Back/Right Side Internal View 1-5
Figure 1-5. Opening the System Board Tray 1-6
Figure 1-6. DIMM Sockets 1-7
Figure 1-7. Power-Supply Paralleling Board 1-11
Figure 1-8. PSPB Power Connector PWR1 1-12
Figure 1-9. PSPB Power Connector PWR2 1-13
Figure 1-10. PSPB Power Connector PWR3 1-13
Figure 1-11. PSPB Power Connector FD 1-13
Figure 1-12. PSPB Power Connector HD_B/P 1-14
Figure 1-13. System Board Components 1-15
Figure 1-14. SCSI Backplane Board 1-16
Figure 1-15. System Board Jumpers 1-17
Figure 3-1. Hard-Disk Drive Indicators 3-17
Figure 4-1. Computer Cover Removal 4-3
Figure 4-2. Front Bezel Removal 4-4
Figure 4-3. Control-Panel Assembly Removal 4-5
Figure 4-4. Drive Hardware 4-6
Figure 4-5. Front-Panel Inserts 4-7
Figure 4-6. Externally Accessible Drive Removal 4-9
Figure 4-7. Drive-Mounting Rail Removal (Example) 4-10
Figure 4-8. Hard-Disk Drives in External Bay 4-11
Figure 4-9. Hard-Disk Drive Removal 4-12
Figure 4-10. SCSI Backplane Board Removal 4-14
Figure 4-11. Power Supply Removal 4-16
Figure 4-12. Power Cable Connections — Single Power Supply 4-17
Figure 4-13. PSPB Tray Location in the System Chassis 4-18
Figure 4-14. PSPB Installation on the PSPB Tray 4-19
Figure 4-15. Power Cable Connections — Multiple Power Supplies . . . 4-20
Figure 4-16. Power-Supply Paralleling Board Removal 4-21
Figure 4-17. System Cooling Fans 4-22
Figure 4-18. Three-Fan Assembly Removal 4-23
Figure 4-19. Drive Fan Removal 4-24
Figure 4-20. System-Board Fan Removal 4-25

Figure 4-21. System Board Components 4-26
Figure 4-22. Expansion-Card Access Door 4-27
Figure 4-23. Expansion Card Removal 4-28
Figure 4-24. Interior Support Panel Removal 4-29
Figure 4-25. DIMM Removal. 4-30
Figure 4-26. DIMM Installation 4-30
Figure 4-27. SEC Cartridge Release Latches 4-31
Figure 4-28. SEC Cartridge and Heat Sink Removal 4-32
Figure 4-29. Terminator Card Removal 4-33
Figure 4-30. System Battery Removal 4-34
Figure 4-31. System-Board Assembly Removal 4-35
Figure 4-32. System Board Removal. 4-36
Figure 4-33. Guide-Bracket Assembly Removal 4-37
Figure A-1. System Setup Screens A-2

Tables

Table 1-1. DC Voltage and Current Ranges 1-10
Table 1-2. Power Cable Connections From the PSPB 1-11
Table 1-3. Jumper Descriptions 1-18
Table 1-4. Interrupt Assignments 1-18
Table 1-5. DREQ Line Assignments 1-19
Table 1-6. Technical Specifications 1-20
Table 3-1. System Beep Codes 3-2
Table 3-2. System Messages 3-5
Table 3-3. Dell OpenManage HIP Alert Log Messages 3-13
Table 3-4. SCSI Hard-Disk Drive Indicator Patterns 3-18
Table A-1. System Setup Options A-3

Read This First

A prerequisite for using this manual to service Dell computer systems is a basic knowledge of IBM®-compatible PCs and prior training in IBM-compatible PC troubleshooting techniques. In addition to information provided in this manual and in the *User's Guide* that came with the system, Dell provides the *Installation and Troubleshooting Guide* for troubleshooting procedures and instructions on using the Dell Diagnostics to test the computer system.

Warnings, Cautions, and Notes

Throughout this manual, there may be blocks of text printed in bold type or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and provides instructions for how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and provides instructions for how to avoid the problem.

NOTE: A NOTE provides helpful information about using the computer system.

CHAPTER 1
System Overview

Dell® PowerEdge® 4300 systems are feature-rich, enterprise-class server systems that use Intel® Pentium® II microprocessor(s) with MMX™ technology and incorporate high-performance PCI and AGP local buses as well as the ISA expansion bus.

The PowerEdge 4300 systems have been designed for better serviceability and increased reliability. The sliding system board tray allows easy access to the system board for performing processor and memory upgrades. The Dell-designed SCSI backplane board and hard-disk drive carriers eliminate the extensive cabling and drive configuration usually required for a SCSI sub-system. The plastic drive rails attached to devices mounted in the external drive bays allow you to remove these devices without removing a single screw. The systems can be either freestanding or rack-mounted.

A PowerEdge 4300 system can contain one or two Pentium II microprocessors. Each processor is housed in a single-edge contact (SEC) cartridge/heat sink assembly mounted in a guide bracket on the system board, allowing for greater heat dissipation. The processor has an internal operating frequency of 350 or 400 MHz (or a higher speed when available) and an external operating frequency of 100 MHz. Contact Dell for information about Dell-supported microprocessor upgrades.

System Features

In addition to the standard features found in a traditional personal computer, Dell PowerEdge 4300 systems include the following new and/or advanced features:

- One or two Intel Pentium II microprocessors with an internal operating frequency of 350 or 400 MHz (or higher speed when available) and an external bus speed of 100 MHz.

*NOTE: Do **not** attempt to operate the system with the microprocessor set to a speed other than the specified rating.*

- Support for symmetric multiprocessing (SMP) when two microprocessors are installed.

NOTE: The second microprocessor must have the same internal operating frequency as the first microprocessor. Not all versions of the Pentium II microprocessor will work properly as an additional microprocessor in this

system; the upgrade kit from Dell contains the correct version for this system.

- A secondary (L2) cache of 512 KB of SRAM included within the SEC cartridge that contains the microprocessor.
- 64-MB and 128-MB (unbuffered) main memory, upgradable to 512 MB, or upgradable to 1 GB using 256-MB registered SDRAM DIMMs.
- BIOS in upgradable flash memory on the ISA bus.
- Up to six hot-pluggable SCSI hard-disk drives. Two additional 1-inch drives can be installed in the optional removable media bay.
- Up to three redundant, hot-pluggable power supplies and a power-supply paralleling board (PSPB), which is necessary for systems with two or more power supplies.
- Five redundant system cooling fans.
- Six 32-bit PCI connectors and two shared 8-bit or 16-bit ISA connectors.
- PCI and AGP local buses and ISA bus.
- A VGA-compatible video subsystem with an ATI 3D Rage Pro AGP video controller. This video subsystem contains 2 MB of SGRAM video memory (nonupgradable).
- A National Semiconductor PC87309 super I/O controller that controls the bidirectional parallel port, two serial ports, and the diskette drive in the externally accessible front bay.
- An integrated Adaptec AIC-7890 Ultra2/LVD SCSI-3 host adapter that supports up to six 16-inch internal SCSI hard-disk drives via a SCSI backplane board and special SCSI hard-disk drive carriers.

NOTE: The 16-inch drive carriers will accommodate 1-inch drives.

The SCSI backplane automatically configures SCSI ID numbers and SCSI termination on individual hard-disk drives, greatly simplifying drive installation. The backplane supports hot-pluggable SCSI hard-disk drive installation and removal when used in conjunction with a PowerEdge Expandable RAID Controller.

- An integrated Adaptec AIC-7860 Ultra/Narrow SCSI-3 host adapter that supports the standard CD-ROM drive and two additional externally accessible SCSI devices in the external hard-disk drive bays.
- Drive failure, online, and activity indicators visible on each hard-disk drive connected to the SCSI backplane.
- Server management circuitry that monitors operation of the system fans as well as critical system voltages and temperatures. The server management circuitry works in conjunction with the HP OpenView Network Node Manager Special Edition (NNM SE) and the Dell OpenManage™ Hardware Instrumentation Package (HIP).
- System board support for the Dell OpenManage Remote Assistant when the optional Dell Remote Assistant Card version 2 (DRAC 2), which provides additional local and remote server management, is installed.

For a complete list of system features, see "Technical Specifications" found later in this chapter. For information about installing the PowerEdge 4300 systems in a rack, see the *Dell PowerEdge 6300 and PowerEdge 4300 Systems Rack Installation Guide*.

When following the text in this manual, assume that the location or direction relative to the computer is as shown in Figure 1-1. Figures 1-2 through 1-4 illustrate front-panel, back-panel, and interior features of the PowerEdge 4300 systems.

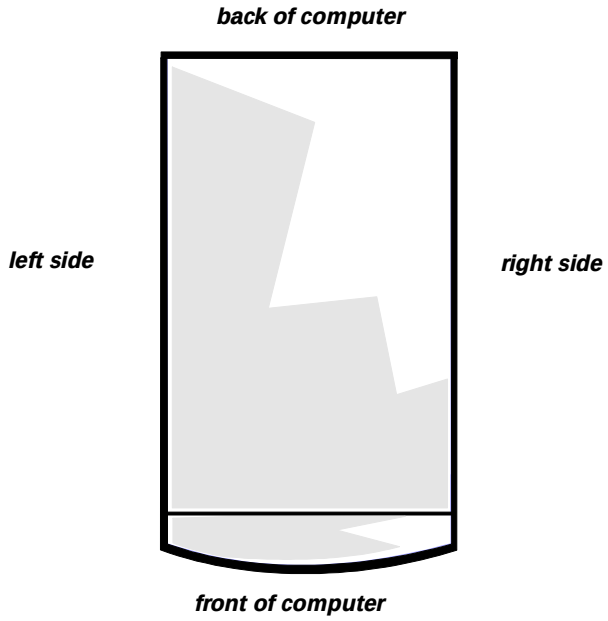


Figure 1-1. Computer Orientation

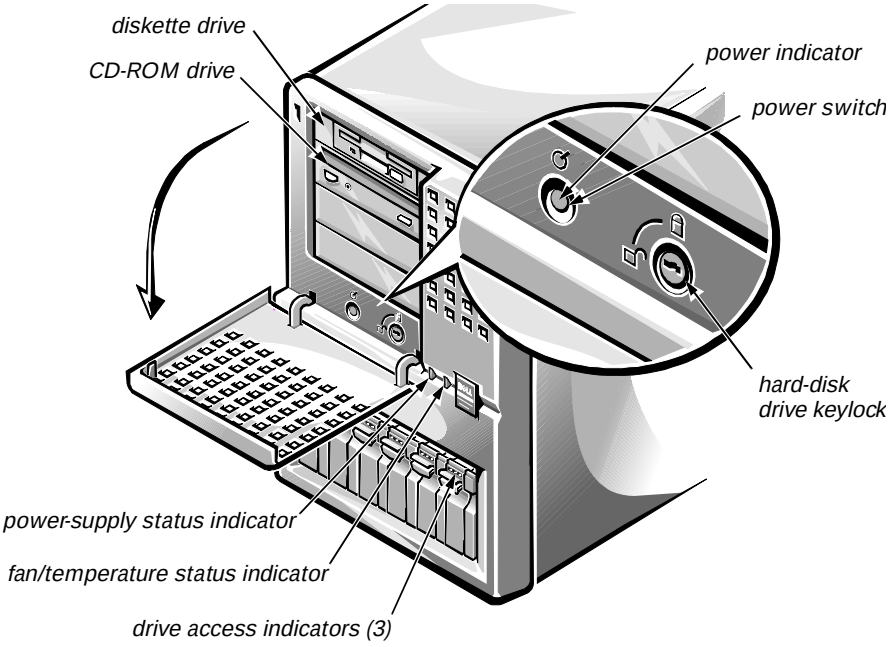


Figure 1-2. Front-Panel Features

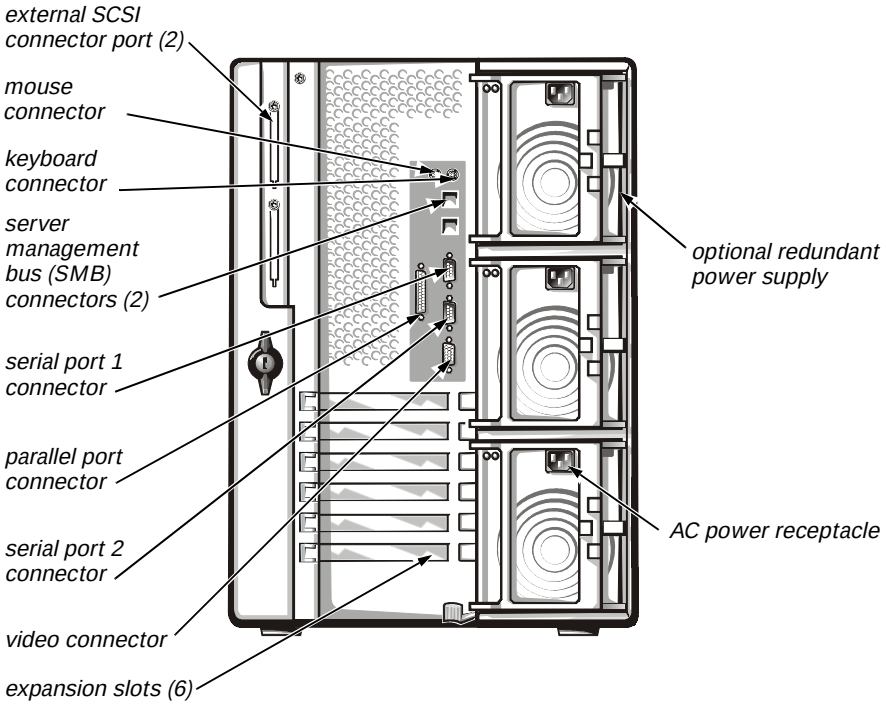


Figure 1-3. Back-Panel Features

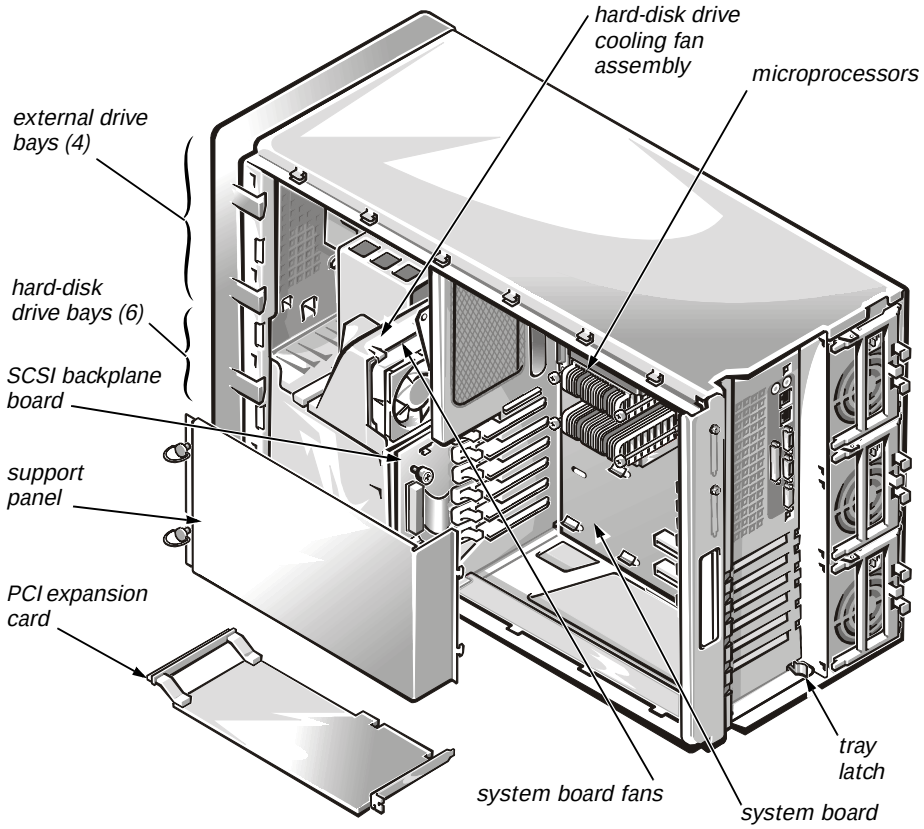


Figure 1-4. Back/Right Side Internal View

Accessing the Interior of the System

To access the SCSI backplane board or the PSPB, release the system-board tray latch at the back lower corner of the tray (see Figure 1-5) and pull the tray open to the first stop position (or *service position*).

NOTE: From the service position, if you depress and release the tray latch and pull the tray out again, you will come to a second stop position that is used by manufacturing. To remove the tray completely from any position, depress the latch, hold it in, and pull the tray out of the chassis.

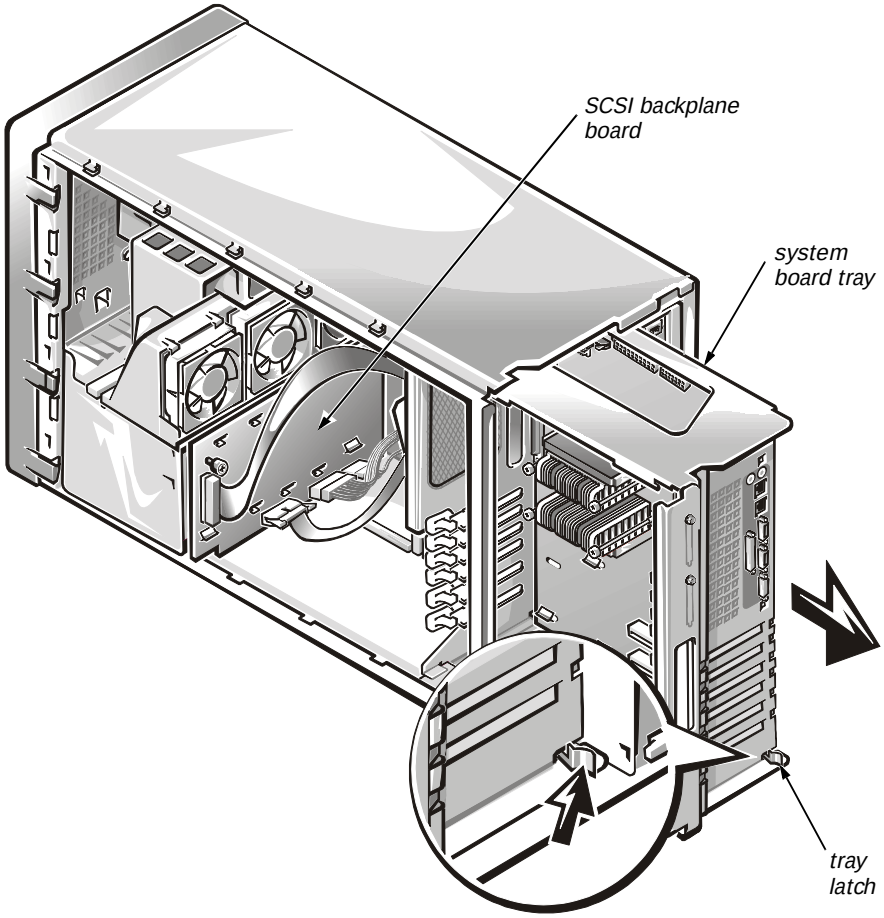


Figure 1-5. Opening the System Board Tray

System Memory

System memory has a minimum of 64 MB of 72-bit-wide, unbuffered memory. The system memory capacity can be expanded up to 1 GB by using combinations of 64- and 128-MB unbuffered SDRAM DIMMs or 256-MB registered SDRAM DIMMs.

NOTE: DIMMs must be rated to run at 100 MHz.

The system board has four 168-pin DIMM sockets. The DIMMs do not have to be inserted in pairs. The socket population guidelines are as follows:

- Populate the DIMM sockets in order from DIMM_A (right) to DIMM_D (left).
- The largest-capacity DIMM should be in socket DIMM_A, with smaller-capacity DIMMs installed in decreasing sizes toward socket DIMM_D.
- Unbuffered and registered DIMMs *cannot* be mixed. Remove any 64- or 128-MB unbuffered DIMMs before installing 256-MB registered DIMMs.
- DIMMs support the ECC feature, which detects memory errors and corrects single-bit memory errors. The ECC feature provides more reliable memory and less downtime. The ECC feature is built into the memory controller on the system board.

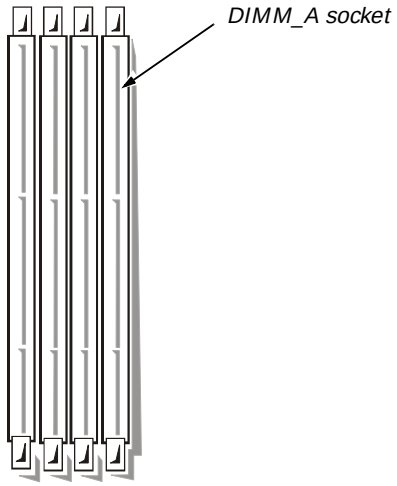


Figure 1-6. DIMM Sockets

For more detailed information about DIMM installation guidelines and samples of DIMM configurations, see "Adding Memory" in Chapter 8 of the *Dell PowerEdge 4300 Systems Installation and Troubleshooting Guide*.

See "DIMMs" in Chapter 4 of this document for information on removing and replacing DIMMs.

Advanced Expansion Subsystems

The computer system offers advanced expansion subsystems that can support a mixture of traditional ISA expansion cards, Plug and Play ISA expansion cards, and PCI expansion cards. The Resource Configuration Utility (RCU) included with the system provides a means of avoiding resource conflicts that might arise from such an arrangement.

After all legacy cards have been configured with the RCU, the system automatically assigns any required memory space, IRQ lines, and DMA channels to any installed Plug and Play ISA expansion cards and PCI expansion cards the next time the system is rebooted. Chapter 5, "Using the Resource Configuration Utility," in the *Dell PowerEdge 4300 Systems User's Guide* describes the RCU and provides instructions for using it to configure the system.

The expansion-card slots include six PCI expansion-card connectors and two ISA expansion-card connectors. Two of the PCI connectors share expansion-card slots with the two ISA connectors. The expansion-card connectors are located on the system board (see Figure 1-13).

Video Controller

The video subsystem is built into the system board and consists of an AGP VGA-compatible video subsystem with an ATI 3D Rage Pro SVGA video controller. The video subsystem contains 2 MB of SGRAM video memory, which is not upgradable. Noninterlaced resolutions are 640 x 480 (16.7 million colors), 800 x 600 (16.7 million colors), and 1024 x 768 (256 colors).

Integrated SCSI Controllers

An integrated Adaptec AIC-7890 Ultra2/LVD SCSI-3 host adapter supports up to six 1- or 1.6-inch internal SCSI hard-disk drives through a 68-pin connector on the system board for a SCSI backplane board. The SCSI backplane board automatically configures SCSI ID numbers and SCSI termination on individual hard-disk drives, greatly simplifying drive installation. The integrated SCSI controller resides on the PCI local bus for optimum performance.

An integrated Adaptec AIC-7860 Ultra/Narrow SCSI-3 host adapter attached to the PCI bus supports up to three SCSI devices in the external drive bays through a 50-pin connector on the system board.

SCSI Hard-Disk Drives

Dell PowerEdge 4300 systems include a SCSI backplane board, which greatly simplifies cabling and configuration for SCSI hard-disk drives. SCSI ID and termination for SCSI hard-disk drives are both configured by the SCSI backplane board, rather than on individual drives. SCSI hard-disk drives are supplied by Dell in special drive carriers that fit in the internal drive bays.

NOTE: For maximum performance, install Ultra2/LVD drives exclusively. Although you can install a mixture of Ultra2/LVD and Ultra hard-disk drives, they will operate at the slower Ultra transfer rate.

SCSI Configuration Guidelines

SCSI hard-disk drives must be configured as follows:

- Disable termination on the drive. The SCSI backplane board provides termination for the SCSI bus.
- Set the SCSI ID on all drives to 0. All SCSI ID numbers for the drives are set by the SCSI backplane board.
- Configure the drive so that the drive motor waits for a **start unit** command from the SCSI host adapter before spinning.

SCSI devices (except hard-disk drives) in the external drive bays are controlled by the Ultra/Narrow SCSI controller on the system board. Hard-disk drives in the external drive bays are controlled by a RAID controller or the Ultra2/LVD SCSI connector via a two-device ribbon cable from the external drive bay insert's backplane board. Although SCSI devices are installed essentially the same way as other devices, their configuration requirements are different. To configure SCSI devices installed in the external bays, follow the guidelines in the following subsections.

SCSI ID Numbers

Each device attached to the Ultra/Narrow SCSI host adapter must have a unique SCSI ID number from 0 to 7.

When SCSI devices are shipped from Dell, the SCSI ID defaults are assigned as follows:

- The integrated Ultra/Narrow SCSI host adapter is configured through the BIOS as SCSI ID 7.
- A SCSI tape drive is configured as SCSI ID 6 (the default for a tape drive).
- A SCSI CD-ROM drive is usually configured as SCSI ID 5.

*NOTE: There is **no** requirement that SCSI ID numbers be assigned sequentially or that devices be attached to the cable in order by ID number.*

Device Termination

All Dell PowerEdge 4300 systems have an active terminator installed at the end of the SCSI cable. *All* of the devices attached to the SCSI cable should have their termination disabled.

PSPB and System Power Supplies

The Dell PowerEdge 4300 system provides one (when available as an option), two, or three 320-W system power supplies and, when necessary, a PSPB. See "System Power Supply" or "System Power Supply and PSPB Upgrade" in Chapter 4 for the installation procedure for this option.

CAUTION: Two or more power supplies and a PSPB must be installed in the system if any of the following system options are installed:

- **A second microprocessor**
- **Two or more RAID controller host adapter cards**
- **More than 512 MB of memory**
- **One or more 1.6-inch hard-disk drives**
- **Hard-disk drive carrier in the external drive bay**

System Power Supplies

The system power supplies are stacked at the rear of the chassis and can slide in and out of the unit. When fully installed, a power supply automatically mates with a power harness attached to the back plate of the power supply cage. The power harness connects the power supply to the PSPB.

The power supplies can operate from an AC power source of 115 VAC at 60 Hz or 230 VAC at 50 Hz. They provide the DC operating voltages and currents listed in Table 1-1.

NOTE: The power supplies produce DC voltages only under their loaded condition. Therefore, when you measure these voltages, the DC power connectors must be mated to their PSPB harnesses at the bulkhead, and the harnesses must be connected to their corresponding power input connectors on the PSPB. The PSPB, in turn, must be connected as appropriate to the system board, SCSI backplane board, or external drive bay.

Table 1-1. DC Voltage and Current Ranges

Voltage	Range	Maximum Output Current[1]
+3.3 VDC	+3.23 to +3.45 VDC	18.0 A
+5 VDC	+4.90 to +5.25 VDC	40.0 A
+12 VDC	+11.40 to +12.60 VDC	16.0 A
–12 VDC	–10.80 to –13.20 VDC	0.5[2] A
–5 VDC	–4.50 to –5.50 VDC	0.3[2] A
+5 VFP	+4.85 to +5.35 VDC	0.4 A

1 *Maximum continuous combined load on +5 VDC and +3.3 VDC outputs cannot exceed 240 W.*

2 *Maximum combined load current on –5 VDC and –12 VDC outputs cannot exceed 0.6 A.*

PSPB

The PSPB multiplexes input from the power supplies to supply redundant power to the system board, SCSI backplane, and external drive bays. Through embedded server management (ESM), the PSPB can also be used to perform such tasks as detecting the presence of one to three power supplies; monitoring voltage and current outputs from the power supplies, voltage going to the

system board, and fan rpm; and supporting the SMB_ALERT protocol used by the server management bus.

The PSPB connects to the power supplies through short harnesses that attach to the back of the power supply cages. The PSPB is attached to the side wall of the computer behind the external drive cage and is oriented in parallel with the system board. For information on removing and replacing the PSPB, see "Power-Supply Paralleling Board" in Chapter 4.

Figure 1-7 shows the PSPB power connector layout; Table 1-2 shows the cable connections made from the PSPB.

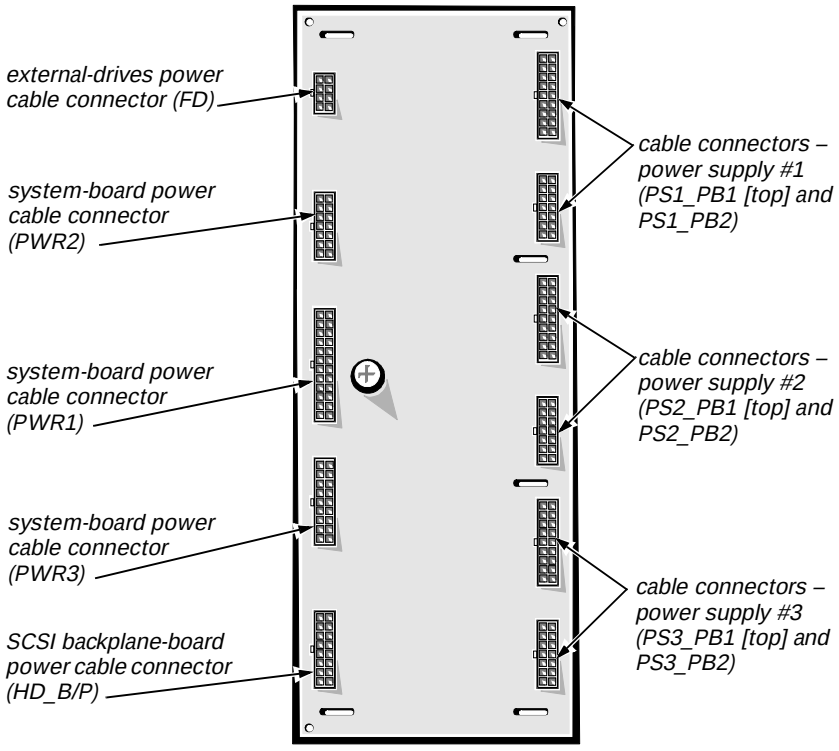

external-drives power cable connector (FD)
system-board power cable connector (PWR2)
system-board power cable connector (PWR1)
system-board power cable connector (PWR3)
SCSI backplane-board power cable connector (HD_B/P)
cable connectors – power supply #1 (PS1_PB1 [top] and PS1_PB2)
cable connectors – power supply #2 (PS2_PB1 [top] and PS2_PB2)
cable connectors – power supply #3 (PS3_PB1 [top] and PS3_PB2)

Figure 1-7. Power-Supply Paralleling Board

Table 1-2. Power Cable Connections From the PSPB

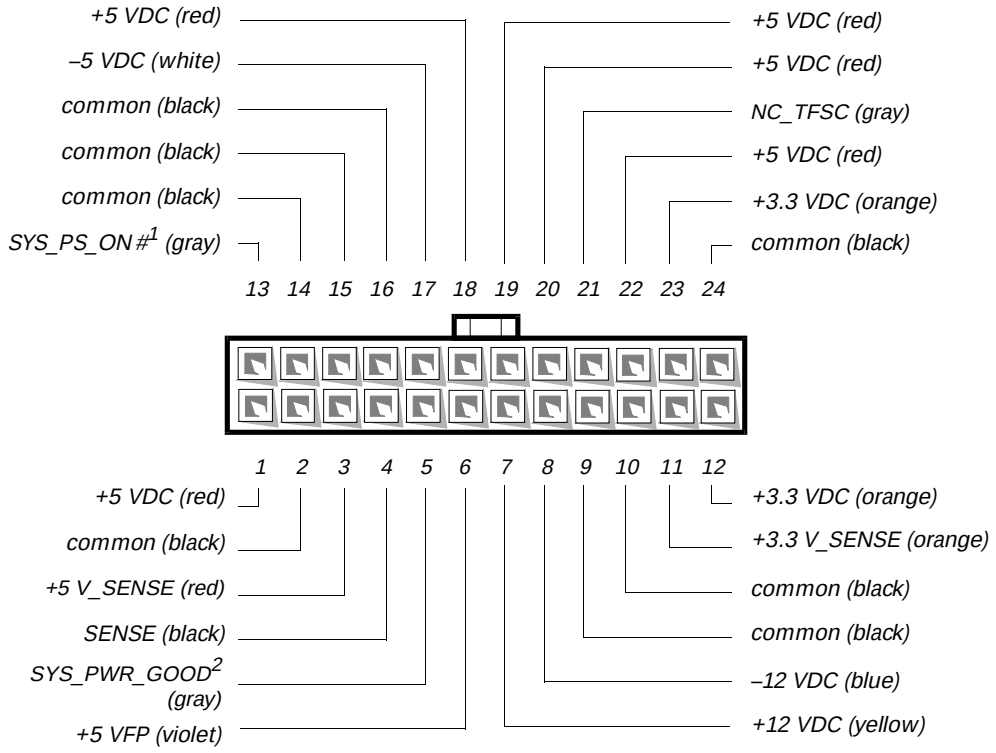
Connector	Cable Connection
PS1_PB1 and PS1_PB2	To the power connector on the first power supply
PS2_PB1 and PS2_PB2	To the power connector on the second power supply
PS3_PB1 and PS3_PB2	To the power connector on the third power supply

Table 1-2. Power Cable Connections From the PSPB *(continued)*

Connector	Cable Connection
PWR1	To POWER1 connector on system board
PWR2	To POWER2 connector on system board
PWR3	Not used
FD	To diskette drives and other devices in external drive bays
HD_B/P	To POWER connector on SCSI backplane board

Pin Assignments for the PSPB Power Connectors

The power-supply output voltages can be measured at the back (wire side) of the connectors without being disconnected. In the following diagrams, voltages for the PSPB PWR*x* connectors are shown as measured at the system board; voltages for the PSPB FD connector are shown as measured at the PSPB; voltages for the PSPB HD_B/P connector are shown as measured at the SCSI backplane.



1 *Pin 13 — SYS_PS_ON# should measure between +4.75 and +5.25 VDC except when the power button on the front panel is pressed, taking SYS_PS_ON# to its active-low state.*

2 *Pin 5 — SYS_PWR_GOOD should measure between +4.75 and +5.25 VDC when the power supply is operating to indicate that all power-supply output voltages are within the ranges specified in Table 1-1.*

Figure 1-8. PSPB Power Connector PWR1

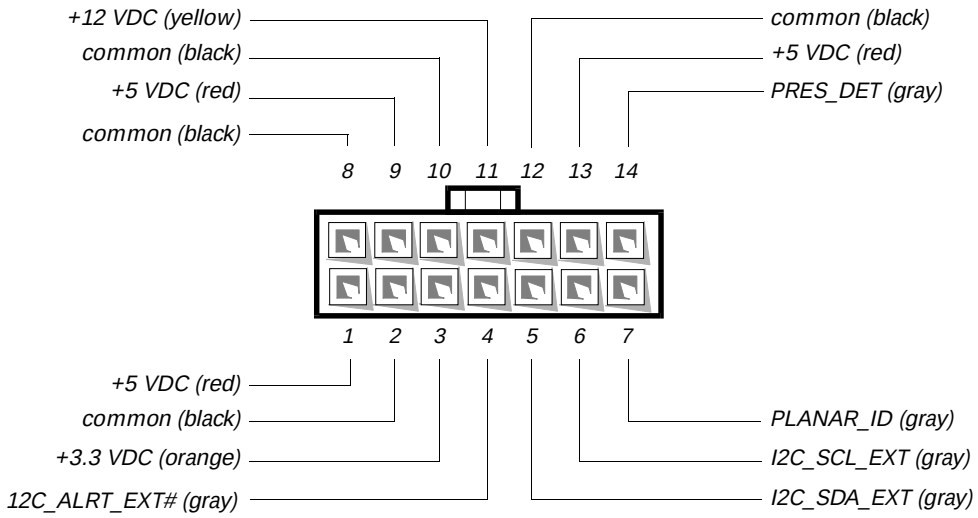


Figure 1-9. PSPB Power Connector PWR2

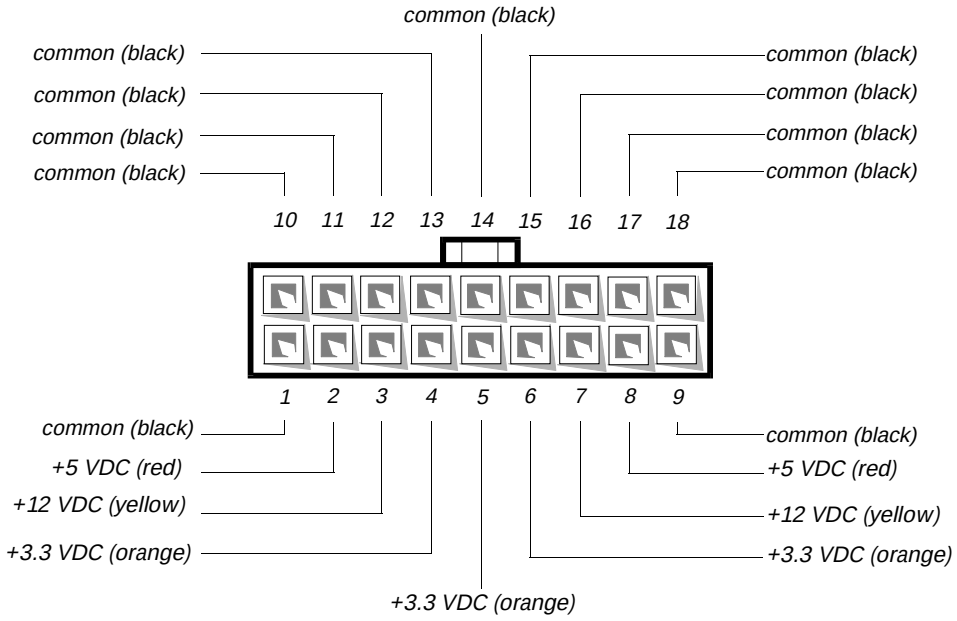


Figure 1-10. PSPB Power Connector PWR3

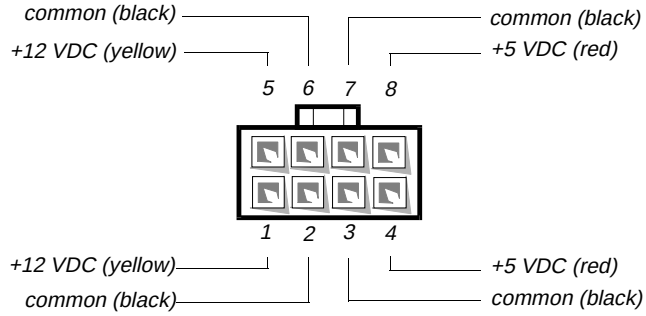


Figure 1-11. PSPB Power Connector FD

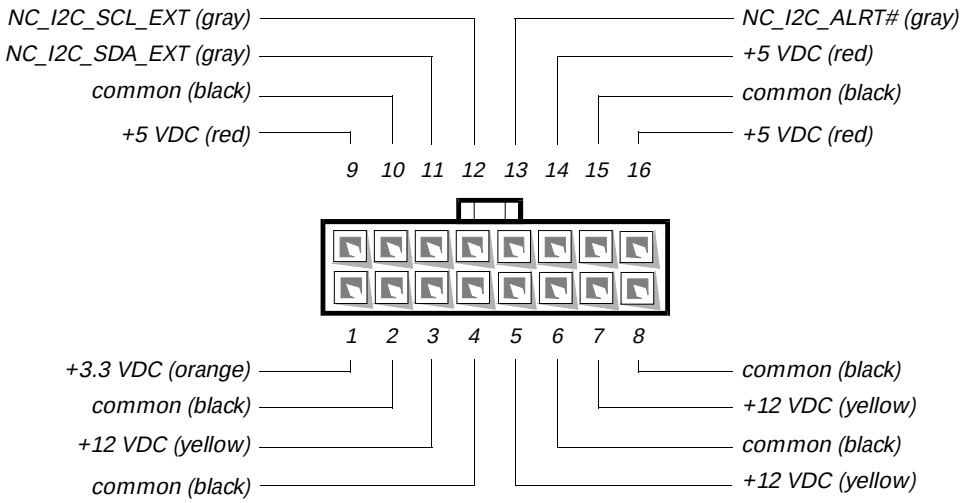


Figure 1-12. PSPB Power Connector HD_B/P

System Board Layout

Figure 1-13 illustrates the location of important system board components. The subsections that follow provide service-related information about the system board components.

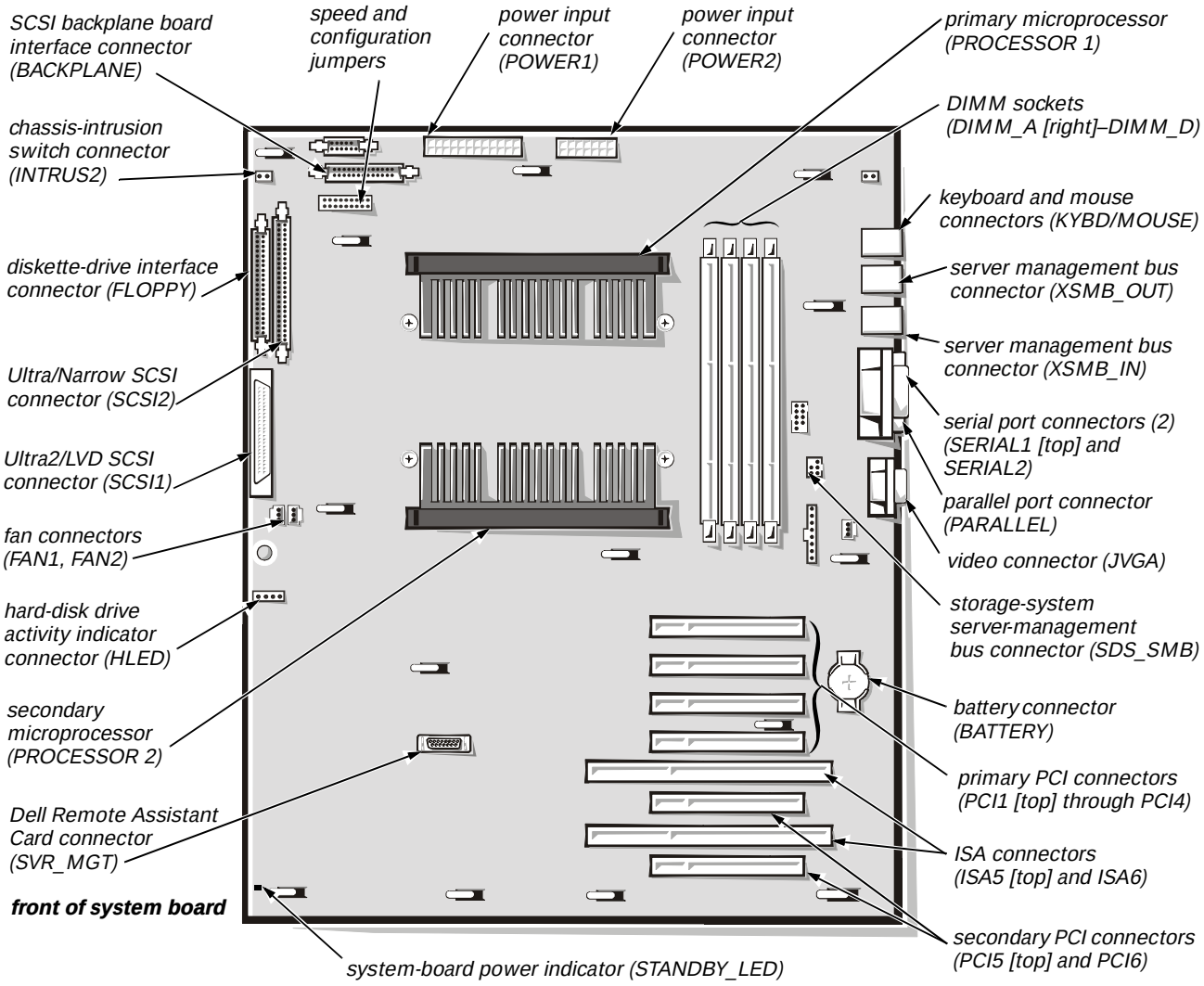

SCSI backplane board interface connector (BACKPLANE)
speed and configuration jumpers
power input connector (POWER1)
power input connector (POWER2)
primary microprocessor (PROCESSOR 1)
DIMM sockets (DIMM_A [right]–DIMM_D)
chassis-intrusion switch connector (INTRUS2)
keyboard and mouse connectors (KYBD/MOUSE)
diskette-drive interface connector (FLOPPY)
server management bus connector (XSMB_OUT)
server management bus connector (XSMB_IN)
Ultra/Narrow SCSI connector (SCSI2)
serial port connectors (2) (SERIAL1 [top] and SERIAL2)
Ultra2/LVD SCSI connector (SCSI1)
parallel port connector (PARALLEL)
fan connectors (FAN1, FAN2)
video connector (JVGA)
storage-system server-management bus connector (SDS_SMB)
hard-disk drive activity indicator connector (HLED)
battery connector (BATTERY)
secondary microprocessor (PROCESSOR 2)
primary PCI connectors (PCI1 [top] through PCI4)
Dell Remote Assistant Card connector (SVR_MGT)
ISA connectors (ISA5 [top] and ISA6)
front of system board
secondary PCI connectors (PCI5 [top] and PCI6)
system-board power indicator (STANDBY_LED)

Figure 1-13. System Board Components

SCSI Backplane Board Layouts

Figure 1-14 shows the location of the connectors on the SCSI backplane board.

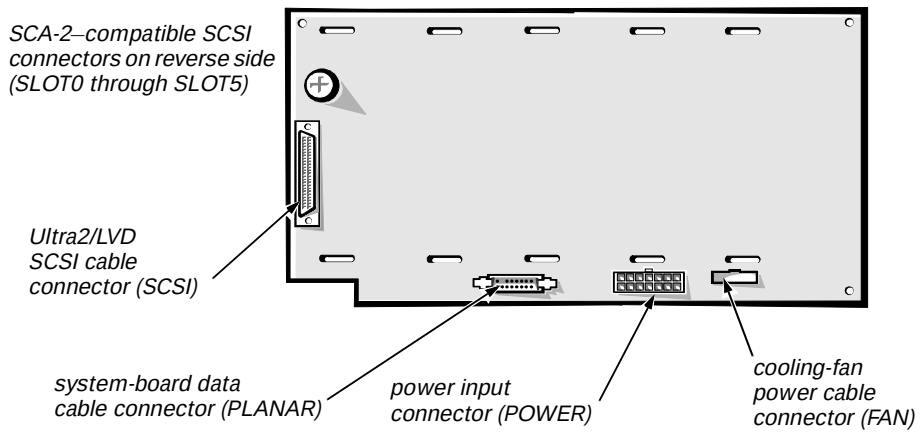

SCA-2–compatible SCSI connectors on reverse side (SLOT0 through SLOT5)
Ultra2/LVD SCSI cable connector (SCSI)
system-board data cable connector (PLANAR)
power input connector (POWER)
cooling-fan power cable connector (FAN)

Figure 1-14. SCSI Backplane Board

CAUTION: If you remove power from the SCSI backplane board (either by removing the power cable or during replacement of the system board battery), you may need to reflash the system's firmware.

The original firmware on the SCSI backplane is stored in EEPROM. However, if the SCSI backplane firmware is ever updated, the update is stored in volatile RAM. If power is removed from an updated backplane board, the update is lost and the board reverts to its original firmware in EEPROM.

If at system start-up you receive the message `Warning: Firmware is out-of-date, please update...`, Dell recommends that you reflash *all* system firmware from the *Dell Server Assistant* CD.

System Board Jumpers

Figure 1-15 illustrates the location of the system board jumpers, and Table 1-3 describes the jumper settings.

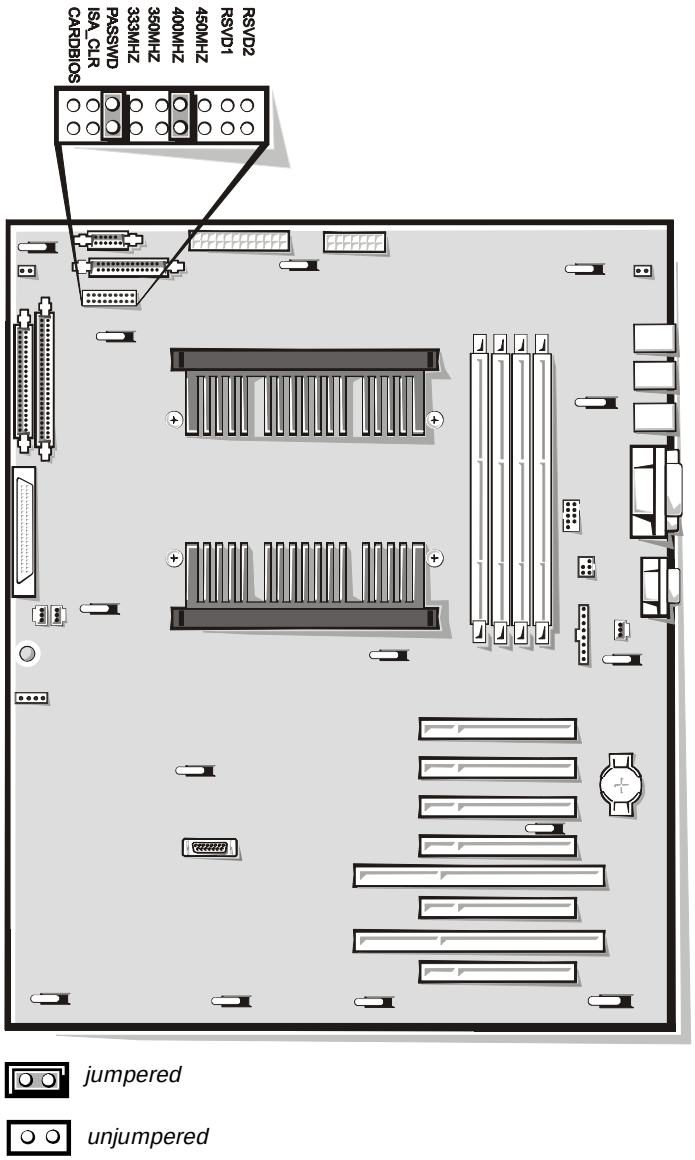


Figure 1-15. System Board Jumpers

Table 1-3. Jumper Descriptions

Jumper	Settings
CARDBIOS	*Not* installed (default) to allow normal boot operation from the system BIOS. Install the jumper only to boot the system from a BIOS expansion card.
ISA_CLR	*Not* installed (default) to retain the ISA configuration settings at system boot. Install the jumper and boot the computer to clear the ISA configuration settings. Remove the jumper before restoring ISA configuration information.
PASSWD	Installed (default) to enable the password feature. Remove the jumper and boot the computer to remove an existing password.
333MHZ	Do *not* install.
350MHZ	Installed only if the microprocessor's internal speed is 350 MHz.
400MHZ	Installed only if the microprocessor's internal speed is 400 MHz.
450MHZ	Installed only if the microprocessor's internal speed is 450 MHz (when available).
RSVD1	Do *not* install. Reserved for future microprocessor speed.
RSVD2	Do *not* install. Reserved for future microprocessor speed.

Interrupt Assignments

Table 1-4 lists the default IRQ line assignments.

Table 1-4. Interrupt Assignments

IRQ Line	Used/Available
IRQ0	Used by the system timer
IRQ1	Used by the keyboard to signal that the output buffer is full
IRQ2	Used by interrupt controller 1 to enable IRQ8 through IRQ15
IRQ3	Used by serial port 2 (COM2 and COM4)
IRQ4	Used by serial port 1 (COM1 and COM3)
IRQ5	Available unless used by a secondary parallel port
IRQ6	Used by the diskette drive controller
IRQ7	Used by the primary parallel port
IRQ8	Used by the RTC
IRQ9	Used for power management functions
IRQ10	Available

Table 1-4. Interrupt Assignments *(continued)*

IRQ Line	Used/Available
IRQ11	Available
IRQ12	Used by the PS/2 mouse port unless mouse is disabled in System Setup program
IRQ13	Used by the math coprocessor
IRQ14	Available
IRQ15	Used by embedded server-management functions

DMA Channel Assignments

Table 1-5 lists the default DMA channel assignments.

Table 1-5. DREQ Line Assignments

DREQ Line	Used By/Available
DREQ0	Available
DREQ1	Available
DREQ2	Generated by super I/O controller to initiate DMA cycle for attached diskette drive
DREQ3	Available
DREQ4	Generated by bus controller chip to activate second DMA controller
DREQ5	Available
DREQ6	Available
DREQ7	Available

Technical Specifications

Table 1-6 lists detailed technical specifications.

Table 1-6. Technical Specifications

Microprocessor	
Microprocessor type	one or two Intel Pentium II microprocessors
Microprocessor speed	350 or 400 MHz (100 MHz externally); 450 MHz (100 MHz externally) (when available)
Internal cache	32-KB L1 cache; 512-KB L2 cache
Math coprocessor	internal to the microprocessor
System Information	
System chip set	Intel 443BX controller chip set
Data bus width	64 bits
Address bus width	32 bits
Expansion Bus	
Bus types	PCI and AGP local buses and ISA bus
Bus speed	AGP: 66.67 MHz PCI: 33.33 MHz ISA: 8.33 MHz
Expansion-card connectors	six 32-bit PCI (four full-length dedicated and two full-length shared) and two shared 8- or 16-bit ISA (full-length) slots
System Clocks	
System clock	100 MHz
Diskette/ communications ports	48 MHz from the system clock
SCSI channels	two 40-MHz channels
Memory	
Architecture	72-bit (64 data bits plus 8 ECC bits), unbuffered SDRAM DIMMs or registered SDRAM DIMMs; DIMMs must be rated for 100-MHz operation
DIMM sockets	four 168-pin sockets
DIMM capacities	64- and 128-MB (unbuffered) and 256-MB (registered)
Standard RAM	64 MB (minimum)
Maximum RAM	1 GB

Table 1-6. Technical Specifications *(continued)*

Memory *(continued)*	
BIOS address	F000:0000h–F000:FFFFh
External cache	none
Integrated SCSI Controllers	
Types	Adaptec AIC-7890 Ultra2/LVD (Fast-40) controller, with integrated 68-pin SCSI connector on the system board; Adaptec AIC-7860 Ultra/Narrow controller, with integrated 50-pin SCSI connector on the system board
Drive Bays	
Externally accessible bays	one 3.5-inch bay dedicated to a diskette drive; one 5.25-inch bay (upper bay) containing a CD-ROM drive; two 5.25-inch bays for optional devices. Optional cage can be installed in the two option bays to support two additional hard-disk drives.
Internally accessible bays	six bays for SCSI hard-disk drives
Ports	
Externally accessible:	
Serial (DTE)	two 9-pin connectors (16550-compatible)
Parallel	one 25-pin connector (bidirectional)
Video	one 15-pin connector (VGA-compatible)
PS/2-style keyboard	6-pin mini-DIN
PS/2-compatible mouse	6-pin mini-DIN
Server-management bus daisy-chain connector	two modular 8-pin connectors
Internally accessible:	
Ultra2/LVD SCSI controller	68-pin connector
Ultra/Narrow SCSI controller	50-pin connector
Diskette drive	34-pin connector
Storage-system server-management bus connector	6-pin header connector

Table 1-6. Technical Specifications *(continued)*

Controls and Indicators	
Power control	push-button behind drive door on front panel
Power indicator	green LED behind drive door on front panel
Fan/temperature status indicator	green LED on front panel (blinks amber for fan failure or out-of-bounds temperature)
Power-supply status indicator	green LED on front panel (blinks amber for power supply or system voltage fault)
Drive online indicator	green LED on each SCSI drive carrier
Drive activity indicator	green LED on each SCSI drive carrier
Drive failure indicator	amber LED on each SCSI drive carrier (blinks if drive failure is detected)
Video	
Video type	ATI 3D Rage Pro AGP video controller; VGA connector
Video memory (standard)	2 MB (not upgradable)
Power	
DC power supply:	
Wattage	320 W per supply (up to three)
Voltage	115 V at 60 Hz; 230 V at 50 Hz
Backup battery	3.0-V CR2032 lithium coin cell
Physical	
Height (with support feet)	44.5 cm (17.5 inches)
Width	30.5 cm (12.0 inches)
Depth	71.1 cm (28.0 inches)
Weight (maximum configuration)	50.0 kg (110.0 lb)

Table 1-6. Technical Specifications *(continued)*

Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	8% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz for 15 min
Storage	0.5 G at 3 to 200 Hz for 15 min
Maximum shock:	
Operating	six shock pulses in the positive and negative x, y, and z axes at 50 G for 2 ms
Storage	six shock pulses in the positive and negative x, y, and z axes at 92 G for 2 ms
Altitude:	
Operating	–16 to 3048 m (–50 to 10,000 ft)
Storage	–16 to 10,600 m (–50 to 35,000 ft)

CHAPTER 2
Basic Troubleshooting

This chapter describes basic troubleshooting procedures that can help you diagnose a computer system problem. These procedures can often reveal the source of a problem or indicate the correct starting point for troubleshooting the system. For a brief explanation of how to load and start the system diagnostics, see "Running the Dell Diagnostics" found later in this chapter. Dell recommends that you perform the following procedures in the order they are presented in this manual.

WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer.

Initial User Contact

When you first contact a user who has a problem, ask the user to describe the problem and the conditions under which it occurs. A verbal description can often indicate the cause of a problem or indicate the appropriate troubleshooting procedure to use. After the user describes the problem, follow these steps:

1. Ask the user to back up any data on the hard-disk drive if the system's condition permits.

   Appendix C, "Maintaining the System," in the *User's Guide* provides information about backing up data.

2. Ask the user to try to duplicate the problem by repeating the operations he or she was performing at the time the problem occurred.

   Can the user duplicate the problem?

   Yes. Proceed to step 3.

   No. Proceed to the next section, "External Visual Inspection."

3. Observe the user to determine if he or she is making an error, such as typing an incorrect key combination or entering a command incorrectly.

   Is the problem a result of user error?

   Yes. Instruct the user in the proper procedure, or direct him or her to the appropriate user documentation for the correct procedure.

   No. Proceed to the next section, "External Visual Inspection."

External Visual Inspection

The external visual inspection consists of a quick inspection of the exterior of the computer, the monitor, the keyboard, any peripherals, and cables. While performing the visual inspection, make any necessary corrections. To perform the external visual inspection, follow these steps:

1. Turn off the computer, the monitor, and all peripherals.
2. Verify that all power cables are properly connected to the computer, the monitor and peripherals, and their power sources.
3. Verify that the keyboard and mouse interface cables are firmly attached to the proper connectors on the back of the computer.

   For a PS/2-compatible mouse, the keyboard and mouse interface cable connectors are identical except for their labels. If needed, see "System Features" in Chapter 1.

   For a serial mouse, the mouse interface cable must be firmly attached to one of the serial port connectors, and its captive screws must be secure enough to ensure a firm connection.
4. If any network cables are present, verify that they are attached properly.
5. Verify that any devices attached to the serial and parallel port connectors are properly connected.

   Each of the serial and parallel port interface cables must be firmly attached to an appropriate connector on the back of the computer as well as to the interface connector on the device. The captive screws that secure these connectors at each end of the interface cable must be secure enough to ensure a firm connection.
6. Verify that the video interface cable is firmly attached to the video connector on the back panel or to a video expansion card, and also to the connector on the back of the monitor.

   For proper connection of the video monitor, see the documentation for the monitor.

7. Inspect all external monitor controls for any obvious damage or improper settings.

   For proper settings of the video monitor controls, see the documentation for the monitor.

8. Inspect the keyboard to ensure that no keys are sticking.

   If one or more keys are sticking, it may be necessary to replace the keyboard.

9. Inspect the exterior of the computer, including all controls and indicators, and all user-accessible data storage devices for any signs of physical damage.

   Does the inspection reveal any problems?

   Yes. Proceed to the appropriate procedure in Chapter 4, "Removing and Replacing Parts."

   No. Proceed to the next section, "Observing the Boot Routine."

Observing the Boot Routine

After you have performed an external visual inspection as described in the previous section, you should boot the system and, while the boot routine is running, observe the system for any indications of problems.

NOTES: Most of the steps in this procedure require observation of system functions and indications, some of which can occur simultaneously. It may be necessary to reboot the system several times to complete all of these steps.

To perform the following procedure, you need a Dell Diagnostics Diskette created from the Dell Server Assistant CD. If such a diskette is not available, you can create it as described in "Create Diskettes" in Chapter 2 of the User's Guide. If a separate diagnostics diskette is included with the system, you may need to use that diskette.

To observe problem indications during the boot routine, follow these steps:

1. If the system is off, turn on all peripherals and the computer. Insert the *Dell Diagnostics Diskette* into the diskette drive and reboot the system.

2. Check each power supply fan.

   Does the fan run normally?

   Yes. Proceed to step 3.

   No. Troubleshoot the system power supplies.

3. Watch the Num Lock, Caps Lock, and Scroll Lock indicators on the upper-right corner of the keyboard. After all three indicators flash momentarily, and following a long pause (approximately 30 seconds), the Num Lock indicator should light up and remain on (unless the **Num Lock** option is set to **Off** in the System Setup program).

   Do these indicators flash on and off within approximately 10 seconds after the boot routine starts?

   Yes. Proceed to step 4.

   No. Troubleshoot the system power supplies. If the troubleshooting procedure indicates that the system power supplies are operational, troubleshoot the memory.

4. During the boot routine, observe the system for any of the following:

   - *Beep codes*: A beep code is a series of beeps that indicates an error condition. If the system emits a beep code, see Table 3-1 later in this manual.
   - *System error messages*: These messages can indicate problems or provide status information. If a system error message is displayed, see Table 3-2 later in this manual.
   - *Diskette-drive and hard-disk drive access indicators*: These indicators light up in response to data being transferred to or from the drives. If either of these indicators fails to light up during the boot routine, troubleshoot the diskette drive or hard-disk drive subsystem, as appropriate.

5. Observe the monitor screen for the **Diagnostics Menu**.

   Does the **Diagnostics Menu** appear?

   Yes. See "Running the Dell Diagnostics" found later in this chapter.

   No. Proceed to step 6.

6. Insert another copy of the *Dell Diagnostics Diskette* into the diskette drive, and reboot the system.

   Does the **Diagnostics Menu** appear?

   Yes. See "Running the Dell Diagnostics" found later in this chapter.

   No. Proceed to the next section, "Internal Visual Inspection."

Internal Visual Inspection

WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer.

CAUTION: Before you proceed with the internal visual inspection described in this section, ensure that the user has saved all open files and exited all open application programs if possible.

WARNING: For systems with nonredundant power supplies, you must turn off power to the system before removing the system power supplies.

A simple visual inspection of a computer's interior hardware can often lead to the source of a problem, such as a loose expansion card, cable connector, or mounting screw. When you perform the visual inspection, refer to "System Features" in Chapter 1 to locate components referenced in the inspection procedure.

To perform the internal visual inspection, follow these steps:

1. Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.

WARNING: Before beginning to work inside the computer, disconnect the power supply from the power source and the power supply cables from the power supply.

2. Remove the computer's right side cover as described in "Computer Cover" in Chapter 4.

WARNING: The SEC cartridge and heat sink assembly can get extremely hot during system operations. Be sure that it has had sufficient time to cool before touching it.

WARNING: When handling the SEC cartridge and heat sink assembly, take care to avoid sharp edges on the heat sink.

3. Verify that the chips, DIMMs, expansion cards, and SEC cartridge and heat sink assembly or assemblies are fully seated in their sockets or connectors.

   To ensure that the chips are fully seated in their sockets, press firmly on the top of each chip.

   To reseat an SEC cartridge and heat sink assembly, remove and reinstall it as described in "SEC Cartridge and Heat Sink Assembly" in Chapter 4.

   To reseat a DIMM, remove it from its socket and reinstall it as described in "DIMMs" in Chapter 4.

If you need to reseat an expansion card, remove the card as described in "Expansion Cards" in Chapter 4, and then reinsert the card in its connector and carefully push it in until fully seated.

4. Verify that all jumpers are set correctly.

   For information about jumper settings, see "System Board Jumpers" in Chapter 1.

5. Check all cable connectors inside the computer to verify that they are firmly attached to their appropriate connectors.

6. Reinstall the computer cover.

7. Reconnect the computer and any attached peripherals to their power sources, and turn them on.

   Does the problem appear to be resolved?

   Yes. No further steps are necessary.

   No. Proceed to the next section, "Eliminating Resource Conflicts," and to "Getting Help" found later in this chapter.

Eliminating Resource Conflicts

Devices within the computer may require dedicated memory spaces, interrupt levels, or DMA channels, all of which must be allocated during installation of the devices. Because devices may be installed at different times, it is possible that the same resource is assigned to two or more devices.

Resource conflicts can result in disorderly or erratic system operation or system failure. If you suspect that resource conflicts might exist, check the system and reassign the resources as necessary.

For additional information, see Chapter 5, "Using the Resource Configuration Utility," in the *User's Guide* or "Interrupt Assignments" and "DMA Channel Assignments" in Chapter 1 of this manual.

Running the Dell Diagnostics

The Dell Diagnostics contains tests that aid in troubleshooting all major components of the computer system. To run the tests, you must first create the *Dell Diagnostics Diskette* using the *Dell Server Assistant* CD as described in "Create Diskettes" in Chapter 2 of the *User's Guide*. If a separate *Dell Diagnostics Diskette* is included with the system, you may need to use that diskette.

To start the Dell Diagnostics, turn off the system, insert the *Dell Diagnostics Diskette* into the diskette drive, and then turn on the system.

Starting the diagnostics causes the Dell logo screen to appear on the monitor screen, followed by a message indicating that the diagnostics is loading. Before the diagnostics loads, a program tests the portion of main memory (RAM) required for loading the diagnostics. If a RAM error is detected, a message telling you which DIMM has failed appears on the screen.

If no errors are found in RAM, the diagnostics loads and the **Diagnostics Menu** appears. This menu lets you choose the following options or exit the Dell Diagnostics:

- **Run All Tests** — Runs all tests for a thorough check of the system
- **Run Quick Tests** — Runs selected tests from all test groups to quickly locate a failure or to indicate where further testing is needed to isolate a failure
- **Run Specific Tests** — Tests a particular area or subsystem

Getting Help

If none of the troubleshooting procedures in this chapter or the tests in the Dell Diagnostics reveals the source of the problem or leads to the proper troubleshooting steps for determining the source of the problem, refer to the Support site at **www.dell.com** or call Dell for technical assistance. For instructions on contacting Dell, see the chapter titled "Getting Help" in the *Installation and Troubleshooting Guide.*

CHAPTER 3
Codes and Messages

This chapter describes beep codes, system messages, alert messages from the Dell OpenManage Hardware Instrumentation Package (HIP) application program, and SCSI hard-disk drive indicator codes that can occur during the POST or during normal system operation.

If a faulty system does not emit beep codes or display system messages to indicate a failure, you should use the Dell Diagnostics to run the appropriate tests to help isolate the source of the problem. See Chapter 5, "Running the Dell Diagnostics," in the Installation and Troubleshooting Guide.

POST Beep Codes

If the monitor cannot display error messages during the POST, the system may emit a series of beeps that identifies the problem or that can help you identify a faulty component or assembly. Table 3-1 lists the beep codes that may be generated during the POST. Most beep codes indicate a fatal error that prevents the system from completing the boot routine until the indicated condition is corrected.

When the system emits a beep code, record the code and then find it in Table 3-1. If the table does not lead to the source of the problem, run the appropriate tests in the Dell Diagnostics to assist in troubleshooting the problem.

Table 3-1. System Beep Codes

Code	Cause	Corrective Action
1-1-3	NVRAM write/read failure	Replace the system board.
1-1-4	BIOS checksum failure	This fatal error usually requires that you reflash the BIOS firmware. If the problem persists, replace the system board.
1-2-1	Programmable interval-timer failure	Replace the system board.
1-2-2	DMA initialization failure	
1-2-3	DMA page register write/read failure	
1-3-1	Main-memory refresh verification failure	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. If the problem still persists, replace the system board.
1-3-2	No memory installed	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. If the problem still persists, replace the system board.
1-3-3	Chip or data line failure in the first 64 KB of main memory	
1-3-4	Odd/even logic failure in the first 64 KB of main memory	
1-4-1	Address line failure in the first 64 KB of main memory	
1-4-2	Parity failure in the first 64 KB of main memory	
2-1-1 through 2-4-4	Bit failure in the first 64 KB of main memory	

Table 3-1. System Beep Codes *(continued)*

Code	Cause	Corrective Action
3-1-1	Slave DMA-register failure	Replace the system board.
3-1-2	Master DMA-register failure	
3-1-3	Master interrupt-mask register failure	
3-1-4	Slave interrupt-mask register failure	
3-2-4	Keyboard-controller test failure	Check the keyboard cable and connector for proper connection. If the problem persists, replace the system board.
3-3-1	CMOS failure	Replace the system board.
3-3-2	System configuration check failure	Replace the system board.
3-3-3	Keyboard controller not detected	
3-3-4	Screen initialization failure	Run the **Video** test group in the Dell Diagnostics.
3-4-1	Screen-retrace test failure	
3-4-2	Search for video ROM failure	
4-2-1	No timer tick	Replace the system board.
4-2-2	Shutdown failure	
4-2-3	Gate A20 failure	
4-2-4	Unexpected interrupt in protected mode	Ensure that all expansion cards are properly seated, and then reboot the system.
4-3-1	Faulty or improperly seated DIMM	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs.
4-3-3	Defective system board	Replace the system board.
4-3-4	Time-of-day clock stopped	Replace the battery. If the problem persists, replace the system board.

Table 3-1. System Beep Codes *(continued)*

Code	Cause	Corrective Action
4-4-1	Super I/O controller failure	Replace the system board.
4-4-2	Parallel-port test failure (defective system board)	
4-4-3	Math coprocessor failure (defective microprocessor)	Replace the microprocessor.
4-4-4	Cache test failure (defective microprocessor)	

System Messages

Table 3-2 lists (in alphabetical order) system messages that can appear on the monitor screen. These messages can help you find the source of a problem. Some of these messages indicate fatal errors. When a fatal error occurs, the system cannot usually be rebooted until an appropriate hardware change has been made.

Table 3-2. System Messages

Message	Cause	Corrective Action
`A maximum of six hard drives is allowed with one power supply`	Attempted to run system with more than six hard-disk drives and only one power supply	Install a PSPB with additional power supplies.
`Address mark not found`	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board)	Replace the system board.
`Alert! Unbuffered and registered DIMMs cannot be mixed`	Combination of unbuffered and registered DIMMs installed	Replace one or more DIMMs so that all DIMMs are the same type. See "Installing DIMMs" and "Removing DIMMs" in Chapter 8 of the system's *Installation and Troubleshooting Guide*.
`Attachment failed to respond`	Diskette drive or hard-disk drive controller cannot send data to associated drive	Replace the drive's interface cable.
`Auxiliary device failure`	Mouse cable connector loose or improperly connected; defective mouse	Check the mouse cable connection. If the problem persists, replace the mouse.

`Bad error-correction code(ECC) on disk read`
 	
`Controller has failed`
	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board)	Replace the system board.

Table 3-2. System Messages *(continued)*

Message	Cause	Corrective Action
`Data error`	Faulty diskette, diskette drive, or hard-disk drive	Replace the diskette, diskette drive, or hard-disk drive.
`Decreasing available memory`	Faulty or improperly seated DIMM	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs.

`Diskette drive 0 seek failure`
 	
`Diskette drive 1 seek failure`
	Faulty or improperly inserted diskette, incorrect configuration settings in System Setup program, loose diskette/tape drive interface cable, or loose power cable	Replace the diskette. Run the System Setup program to correct the diskette drive type. Check the diskette/tape drive interface cable and power cable connections to the drive.

`Diskette read failure`	Faulty diskette, faulty or improperly connected diskette/tape drive interface cable, or loose power cable	Check the diskette/tape drive interface cable and power cable connections to the drive. Replace the diskette drive interface cable.
`Diskette subsystem reset failed`	Faulty diskette/tape drive controller (defective system board)	Replace the system board.
`Diskette write protected`	Diskette write-protect feature activated	Move the write-protect tab on the diskette.
`Drive not ready`	Diskette missing from or improperly inserted in diskette drive	Reinsert or replace the diskette.
`ECC host bus parity interrupt at` *`address`*	Defective system board	Replace the system board.
`ECC memory parity interrupt at` *`address`*	Faulty or improperly seated DIMM or defective system board	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. If the problem still persists, replace the system board.

Table 3-2. System Messages *(continued)*

Message	Cause	Corrective Action

`Embedded server management error`
 	
`Embedded server management is not present`
	Embedded server management memory may be temporarily corrupted	Shut down the system to clear the memory, and then restart the system. If the problem persists, disconnect all power cables from the system for at least one minute; then try again.

`Gate A20 failure`	Faulty keyboard controller (defective system board)	Replace the system board.
`General failure`	Corrupted or improperly installed operating system	Reinstall the operating system.

`Hard disk drive read failure`
 	
`Hard disk failure`
	Incorrect configuration settings in System Setup program, improperly connected hard-disk drive, faulty hard-disk drive controller subsystem (defective system board), or loose power cable	Check the primary and secondary SCSI configuration settings in the System Setup program. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board. If the problem still persists, replace the system board.

`Invalid configuration information - please run SETUP program`	Incorrect ISA_CLR jumper configuration, incorrect configuration settings in System Setup program, or faulty battery	Remove the plug from the ISA_CLR jumper. Check the System Setup configuration settings. Replace the battery.
`Invalid CPU speed detected - check jumpers`	Incorrect microprocessor jumper configuration	Check the microprocessor speed jumper.
`Invalid NVRAM configuration, resource reallocated`	Resource conflict detected and corrected when system resources were allocated using the RCU	No action is required.

Table 3-2. System Messages *(continued)*

Message	Cause	Corrective Action
`I/O parity interrupt at` *`address`*	Improperly installed or faulty expansion card	Reinstall the expansion card(s). If the problem persists, replace the expansion card(s).

`Keyboard clock line failure`
 	
`Keyboard failure`
	Loose or improperly connected keyboard cable connector, defective keyboard, or defective keyboard/mouse controller (defective system board)	Check the keyboard cable connection. Replace the keyboard. If the problem persists, replace the system board.

`Keyboard controller failure`	Defective keyboard/ mouse controller (defective system board)	Replace the system board.

`Keyboard data line failure`
 	
`Keyboard stuck key failure`
	Loose or improperly connected keyboard cable connector, defective keyboard, or defective keyboard/mouse controller (defective system board)	Check the keyboard cable connection. Replace the keyboard. If the problem persists, replace the system board.

Table 3-2. System Messages *(continued)*

Message	Cause	Corrective Action
Memory address line failure at *address*, read *value* expecting *value* Memory double word logic failure at *address*, read *value* expecting *value* Memory odd/even logic failure at *address*, read *value* expecting *value* Memory write/read failure at *address*, read *value* expecting *value*	Faulty or improperly seated DIMM or defective system board	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. If the problem still persists, replace the system board.
Memory allocation error	Faulty application program	Restart the application program.
Memory parity interrupt at *address*	Faulty or improperly seated DIMM	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs.
Memory tests terminated by keystroke	POST memory test terminated by pressing the spacebar	No action is required.
No boot device available	Faulty diskette, diskette/tape drive subsystem, hard-disk drive, or hard-disk drive subsystem, or no boot diskette in drive A	Replace the diskette or hard-disk drive. If the problem persists, replace the system board.

Table 3-2. System Messages *(continued)*

Message	Cause	Corrective Action
`No boot sector on hard-disk drive`	Incorrect configuration settings in System Setup program or no operating system on hard-disk drive	Check the hard-disk drive configuration settings in the System Setup program.
`No timer tick interrupt`	Defective system board	Replace the system board.
`Non-system disk or disk error`	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem	Replace the diskette or hard-disk drive. If the problem persists, replace the system board.
`Not a boot diskette`	No operating system on diskette	Use a bootable diskette.
`Not more than 512 MB of memory is allowed with one power supply`	Attempted to run system with more than 512 MB of memory and only one power supply	Install a PSPB with additional power supplies.
`Only one microprocessor is allowed with one power supply!`	Attempted to run two microprocessors with one power supply	Install a PSPB with additional power supplies.
`Only one RAID controller is allowed with one power supply!`	Attempted to run more than one RAID controller with one power supply	Install a PSPB with additional power supplies.
`Plug & Play Configuration error`	Plug and Play or PCI resource configuration failure	Reboot the system. If the problem persists, run the RCU to identify the resource conflict and then reallocate system resources accordingly.

Table 3-2. System Messages *(continued)*

Message	Cause	Corrective Action
`Processor or terminator card not installed!`	No microprocessor or terminator card installed in one of the microprocessor guide bracket assemblies	Ensure that each microprocessor guide bracket assembly has either a terminator card or a microprocessor installed. See Chapter 8, "Installing System Board Options," in the system's *Installation and Troubleshooting Guide* for instructions.

`Read fault`
 	
`Requested sector not found`
	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem (defective system board)	Replace the diskette or hard-disk drive. If the problem persists, replace the system board.

`Reset failed`	Improperly connected diskette/tape drive, hard-disk drive, or power cable	Check the diskette/tape drive interface cable and power cable connections to the diskette drive. Replace the diskette/tape drive interface cable. Reinstall the hard-disk drive. Check the interface cable and power cable connections to the backplane board.
`ROM bad checksum =` *`address`*	Improperly installed or faulty expansion card	Reinstall the expansion card(s). If the problem persists, replace the expansion card(s).

`Sector not found`
 	
`Seek error`
	Defective sectors on diskette or hard-disk drive	Replace the diskette or hard-disk drive.

`Seek operation failed`	Faulty diskette or hard-disk drive	Replace the diskette or hard-disk drive.
`Shutdown failure`	Defective battery	Replace the battery.
`Time-of-day clock stopped`	Defective battery or faulty chip (defective system board)	Replace the battery. If the problem persists, replace the system board.

Table 3-2. System Messages *(continued)*

Message	Cause	Corrective Action
`Time-of-day not set`	Incorrect **Time** or **Date** settings or defective system battery	Check the **Time** and **Date** settings. If the problem persists, replace the battery.
`Timer chip counter 2 failed`	Defective system board	Replace the system board.
`Unexpected interrupt in protected mode`	Faulty or improperly seated DIMM or defective system board	Remove and reseat the DIMMs. If the problem persists, replace the DIMMs. If the problem still persists, replace the system board.
`Unsupported CPU detected in SLOT n`	Microprocessor not supported by system	Install a correct version of the microprocessor in the specified microprocessor connector.
`Unsupported CPU speed in CMOS`	Microprocessor not supported by BIOS	Upgrade the BIOS.
`Unsupported CPU speed, processor missing, or terminator card missing - System halted!`	Wrong microprocessor speed; no microprocessor or terminator card installed in one or more of the microprocessor connectors	Ensure that each microprocessor connector has either a terminator card or a microprocessor installed. Ensure only 100-MHz microprocessors are used.
`Warning: Firmware is out-of-date, please update ...`	Some portion of system firmware is out of date, possibly as result of power being removed from the system while servicing the battery, PSPB, system board, or SCSI backplane	Reflash the system firmware from the *Dell Server Assistant* CD (if available) or from the Dell Web site.

`Write fault`
 	
`Write fault on selected drive`
	Faulty diskette or hard-disk drive	Replace the diskette or hard-disk drive.

Alert Messages From Dell OpenManage HIP

The Dell OpenManage HIP server-management application program generates alert messages that appear in the Simple Network Management Protocol (SNMP) trap log file. To see the trap log, select any enterprise under the SNMP trap log icon.

Alert log messages consist of information, status, warning, and failure messages for drive, temperature, fan, and power conditions. They can assist you with identifying a problem and may provide you with information to help you resolve the problem.

Table 3-3 lists some of the alert log messages from the Dell OpenManage HIP application program.

Table 3-3. Dell OpenManage HIP Alert Log Messages

Message	Cause	Corrective Action
`Automatic management notification has occurred`	The server stopped functioning and called the notification number specified in the **DC Console Actions** tab.	The server will reboot if the **Reset** or **Power Cycle** option was selected in the **Action on Hung Server Notification** section of the System Console **System** tab. If neither option was selected, the system can be reset using the Remote Management feature in the Dell Remote Assistant Card utility.
`Chassis intrusion detected`	The chassis of an attached system has been opened.	Check to make sure the system chassis is closed.
`Current sensor detected a failure`	The system power consumption is exceeding power supply capacity. The power supply name is provided.	Verify that all of the expansion cards in the system are functioning properly. Verify that the load requirements of the hardware configured in the system do not exceed the capacity of the power supplies.

Table 3-3. Dell OpenManage HIP Alert Log Messages *(continued)*

Message	Cause	Corrective Action
`Current sensor warning detected`	The system power consumption is exceeding power supply capacity. The power supply name is provided.	Verify that all of the expansion cards in the system are functioning properly. Verify that the load requirements of the hardware configured in the system do not exceed the capacity of the power supplies.
`ECC memory fault`	An ECC error has occurred in system memory.	Run the appropriate memory test(s) from the Dell Diagnostics.
`Fan sensor detected a failure`	A failure of one or more fans was detected by the thermal-monitoring facility in the specified server. If possible, the chassis number and fan number are provided.	Check for a possible blockage of or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections.
`Fan sensor warning detected`	A fan sensor reading on the specified server has exceeded the user-settable warning thresholds. If possible, the chassis number and fan number are provided.	Check for a possible blockage of or inadequate ventilation around the fan. If the fan is not blocked and ventilation is adequate, check fan connections.
`Power supply degraded redundancy detected`	In systems with optional redundant power supplies, a power supply has failed or a power utilization warning threshold has been exceeded. The system will function normally in this configuration and is still redundant.	Check to see whether the power supply indicators show a power supply failure. Make sure that the latch switch on each power supply is enabled. Make certain that each connection to the power source is secure. Check the power utilization warning thresholds to verify that they are valid values.

Table 3-3. Dell OpenManage HIP Alert Log Messages *(continued)*

Message	Cause	Corrective Action
`Power supply detected a failure`	In systems with optional redundant power supplies, the power supply sensor detected a failure in one of the power supplies. If possible, the power supply number is provided.	Check to see whether the power supply indicators show a power supply failure. Make sure that the latch switch on each power supply is enabled. Make certain that each connection to the power source is secure.
`Power supply lost redundancy detected`	In systems with optional redundant power supplies, the system has detected that it has lost power supply redundancy. If one (or another) of the power supplies fails, the system will not be able to maintain operation. This could be the result of a failed power supply or too many adapters installed in the system.	Check to see whether the power supply indicators show a power supply failure. Make sure that the latch switch on each power supply is enabled. Make certain that each connection to the power source is secure. This could be a normal condition because the default system configuration is nonredundant. The system will function normally in a nonredundant configuration.
`Temperature sensor detected a failure`	A temperature probe on the backplane board, system board, or drive carrier in the specified server has exceeded its temperature failure range. If possible, the chassis number and probe number are provided.	Check for a fan failure. If needed, replace the fan or fan assembly.

Table 3-3. Dell OpenManage HIP Alert Log Messages *(continued)*

Message	Cause	Corrective Action
`Temperature sensor warning detected`	A temperature probe on the backplane board, system board, or drive carrier in the specified server has exceeded its temperature warning range. If possible, the chassis number and probe number are provided.	Make sure the fan thresholds are set in a reasonable range. Check for a fan failure. Make sure the computer cover is properly installed.
`Voltage sensor detected a failure`	A failure has occurred with the system power supply or voltage probe(s) on the system board. If possible, the chassis number and probe number are provided.	Check the power supply and backplane board connections.
`Voltage sensor warning detected`	The voltage probe on the backplane board, system board, or power supply for the specified server has exceeded its warning range. If possible, the chassis number and probe number are provided.	Make sure the user-settable voltage thresholds are set correctly. If the problem persists, check the power supply and backplane board connections.

SCSI Hard-Disk Drive Indicator Codes

Three indicator lights in each SCSI hard-disk drive carrier provide information on the status of the SCSI hard-disk drives (see Figure 3-1). The SCSI backplane firmware controls the drive online and drive failure indicators.

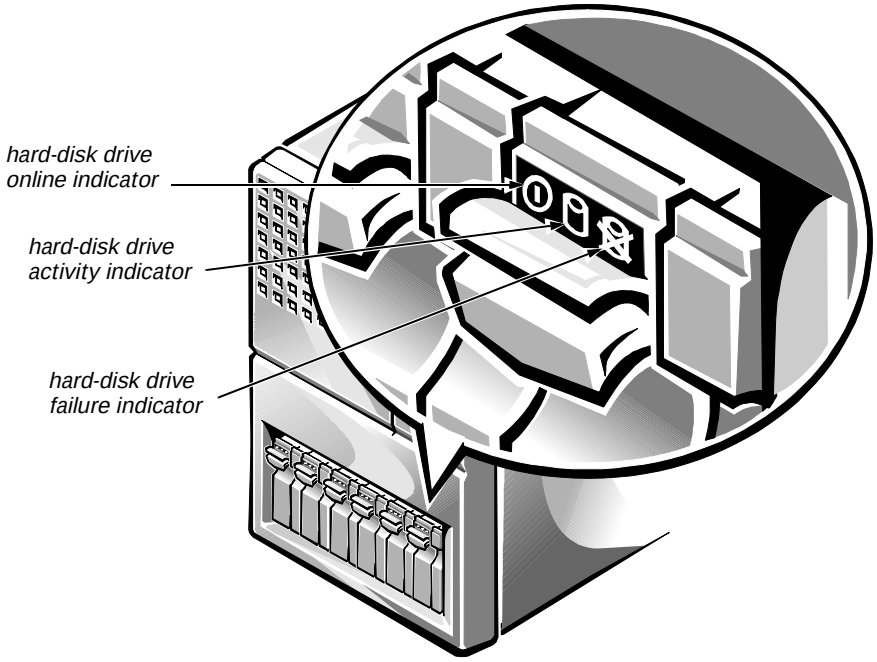


Figure 3-1. Hard-Disk Drive Indicators

Table 3-4 lists the drive indicator patterns established by the SCSI backplane firmware. Different patterns are displayed as drive events occur in the system. For example, in the event of a hard-disk drive failure, the *drive failed* pattern appears. After the drive is selected for removal, the *drive being prepared for removal* pattern appears, followed by the *drive ready for insertion or removal* pattern. After the replacement drive is installed, the *drive being prepared for operation* pattern appears, followed by the *drive online* pattern.

NOTE: If you do not have a Dell PowerEdge Expandable RAID Controller host adapter card installed, you will see only the drive online and drive bay empty indicator patterns.

Table 3-4. SCSI Hard-Disk Drive Indicator Patterns

Condition	Indicator Pattern
Identify drive	All three drive status indicators blink simultaneously.
Drive being prepared for removal	The three drive status indicators flash sequentially.
Drive ready for insertion or removal	All three drive status indicators are off.
Drive being prepared for operation	The drive online indicator is on. The drive activity light may flash briefly.
Drive bay empty	All three drive status indicators are off.
Drive predicted failure	The drive online indicator is on. The drive failure indicator blinks on briefly each second.
Drive failed	The drive online indicator turns off. The drive failure indicator blinks off briefly each second.
Drive rebuilding	The drive online indicator blinks rapidly.
Drive online	The drive online indicator is on.

CHAPTER 4
Removing and Replacing Parts

This chapter provides procedures for removing the components, assemblies, and subassemblies in the computer. Unless otherwise noted, each procedure is based on the following assumptions:

- You have performed the steps in "Precautionary Measures" found later in this chapter.
- You have removed the computer cover and/or front bezel as necessary.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

WARNING: The power supplies in this computer system produce high voltages and energy hazards, which can cause bodily harm. Only trained service technicians are authorized to remove the computer cover and access any of the components inside the computer.

Recommended Tools

The PowerEdge 4300 has been designed for greater manual serviceability. Removing and replacing hard-disk drives in the external drive bay insert requires a small flat-blade screwdriver. The remaining procedures do not require the use of tools.

Also, use a wrist grounding strap as explained in the next section, "Precautionary Measures."

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the computer system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT

Before you start to work on the computer, perform the following steps in the sequence listed:

1. **Turn off the computer and any attached peripherals.**
2. **Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury.**
3. **Disconnect any communications cables.**
4. **Wear a wrist grounding strap, and clip it to any unpainted metal surface on the computer chassis.**

   If a wrist grounding strap is not available, touch any unpainted metal surface on the back of the computer chassis to discharge any static charge from your body.

Computer Cover

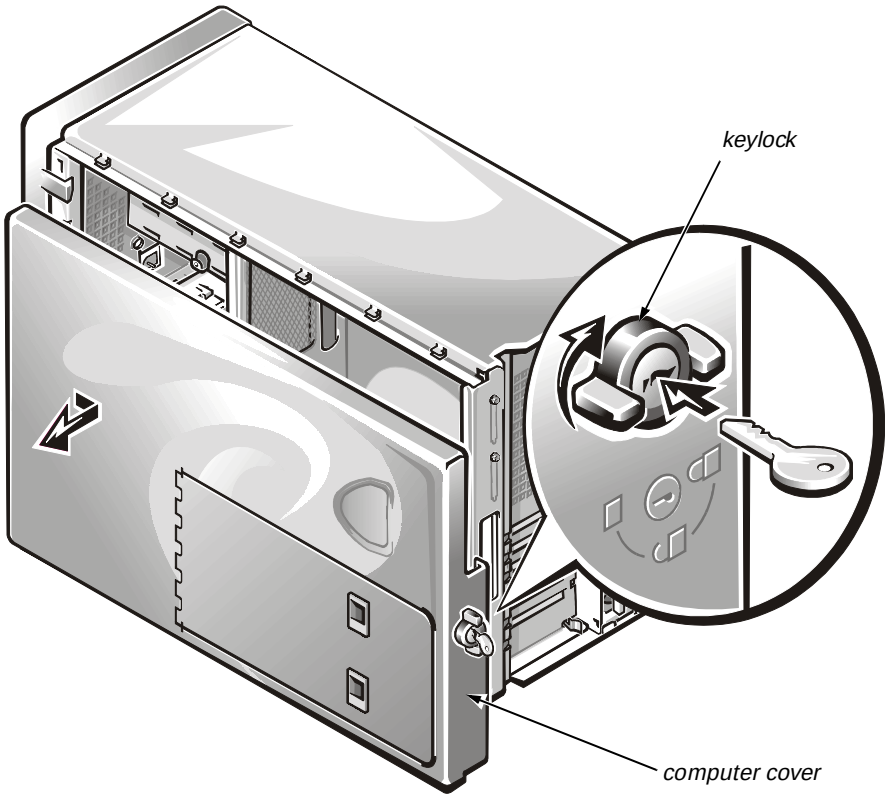


Figure 4-1. Computer Cover Removal

To remove the computer cover, follow these steps:

1. Turn the keylock on the back edge of the cover clockwise to the unlocked position (see Figure 4-1).
2. Slide the cover a half-inch (about a centimeter) or so toward the back of the computer, and grasp the top of the cover at both ends.
3. Lift the cover away from the chassis.

To replace the cover, make sure the keylock is in the unlocked position. Fit the cover over the side rail at the bottom of the chassis and slide it closed.

Front Bezel

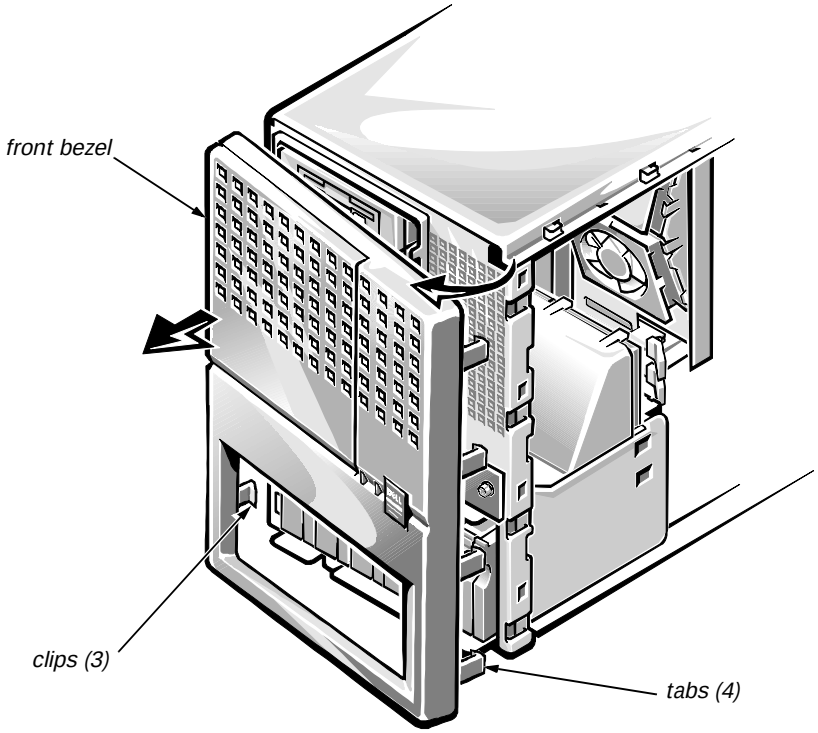


Figure 4-2. Front Bezel Removal

To remove the front bezel, follow these steps:

1. Remove the computer cover.
2. With your fingertips, gently pry loose the four tabs along the right edge of the bezel, and disengage the three clips on the opposite edge from the chassis (see Figure 4-2).
3. Rotate the bezel to the left to disengage it.

To replace the bezel, align the three clips on the edge of the bezel with the slots on the chassis and press the bezel into place until the tabs on the opposite edge of the bezel snap into place.

Control Panel Assembly

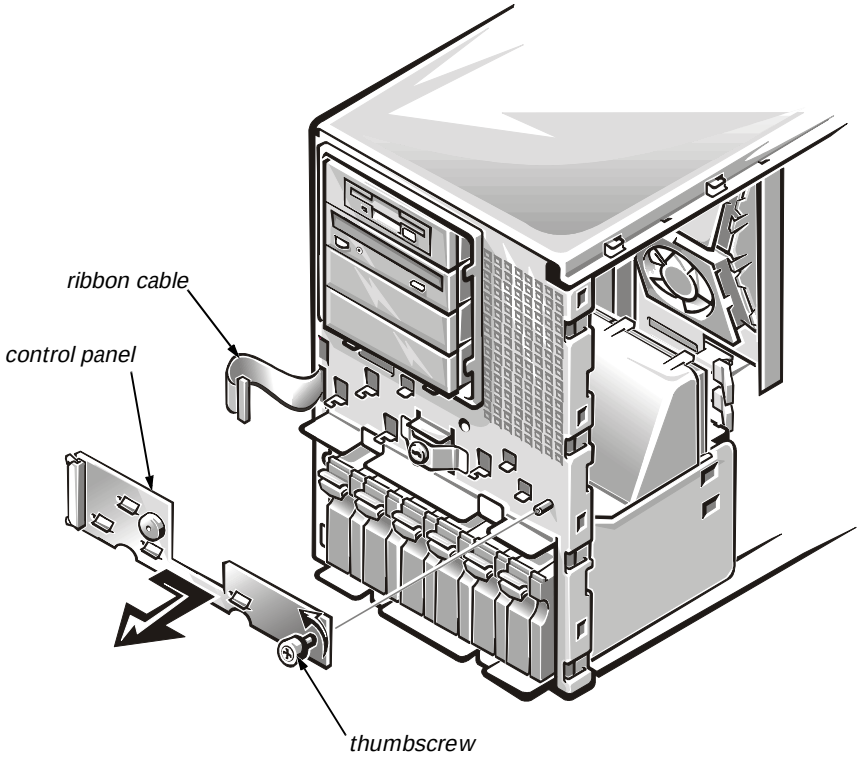


Figure 4-3. Control-Panel Assembly Removal

To remove the control panel assembly, follow these steps:

1. Disconnect the ribbon cable from its connector on the left side of the control panel assembly (see Figure 4-3).
2. Loosen the thumbscrew securing the control panel assembly to the front of the chassis.
3. Slide the control panel assembly to the right (or up if system is in rack-mount position) to disengage the assembly from the chassis hooks.

NOTE: The ribbon cable that attaches to the control panel assembly connects to the PLANAR connector on the SCSI backplane and then continues on to the BACKPLANE connector on the system board.

Drives

Figure 4-4 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

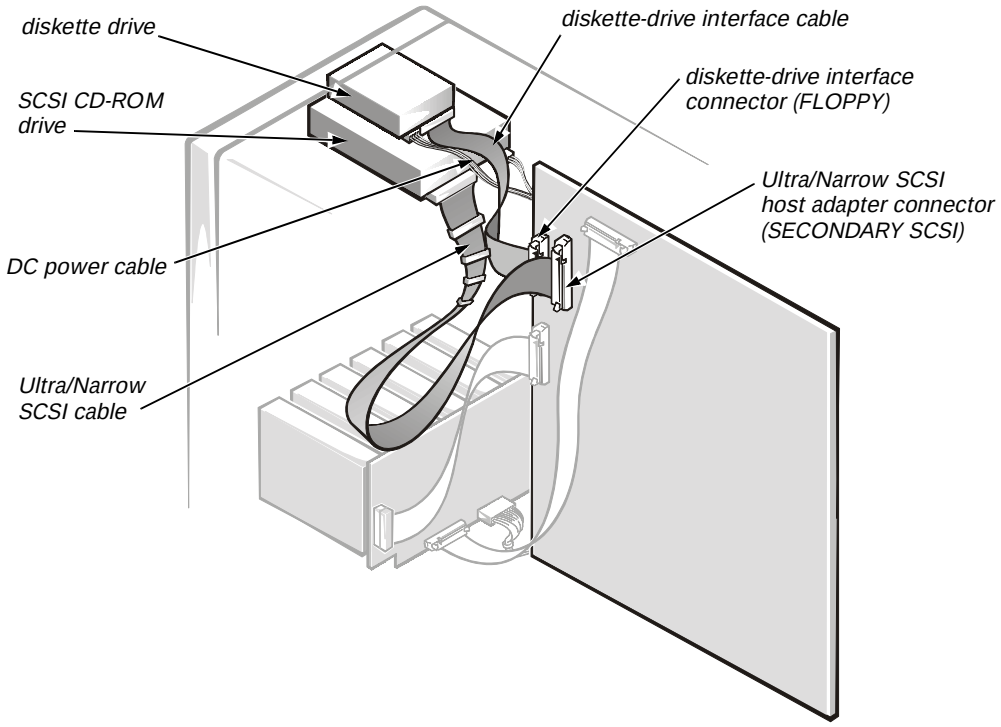


Figure 4-4. Drive Hardware

Externally Accessible Drives

The chassis provides three bays for 5.25-inch externally accessible drives and a bay dedicated to a 3.5-inch diskette drive.

Front-Panel Inserts

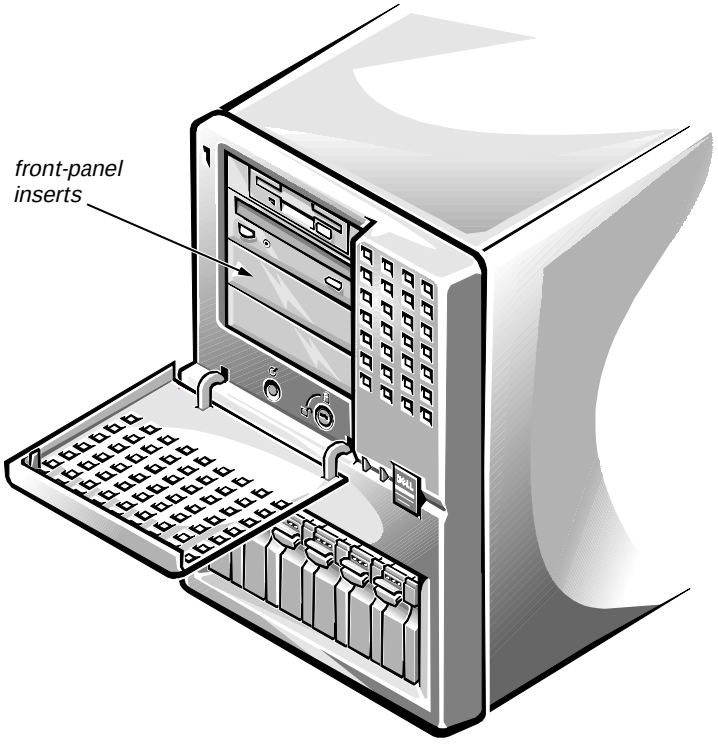


Figure 4-5. Front-Panel Inserts

To remove the front-panel insert that covers an unused bay (see Figure 4-5), first remove the front bezel. Then, facing the inside of the front bezel, press one of the securing tabs (located at each end of the bezel) while pressing against the center of the insert until it springs free from the bezel.

To replace a front-panel insert, from inside the chassis place the insert into the bay opening and press it into place until the tabs on each end of the insert snap into the latches on the inside of the bezel.

Close-Out Panels

Metal close-out panels that fit into the drive-bay openings in the chassis provide extra EMI shielding if you are not using the plastic front-panel inserts. The close-out panel for a 1.6-inch bay has a raised lip at the bottom that overlaps the top of a panel beneath it, if any. Because of the overlap, if two or more 1.6-inch close-out panels are installed, you must remove them from the top down. The close-out panel for the 1-inch diskette-drive bay (the top bay in either chassis orientation) is narrower and has no overlap lip.

To remove a close-out panel, pry the bottom of the panel outward at the center until you can unhook a securing tab at one end and work out the other end.

When installing close-out panels, install 1.6-inch panels from the bottom up. Make sure the overlap lip is at the bottom and projecting toward you. Insert the tab on one side of the panel into the appropriate slot in the drive cage, bow the panel slightly, and fit the second tab into the slot in the other side of the cage. Make sure the sides of the panel fit flush against the sides of the drive cage.

Reorienting the External Drive Cage

To accommodate a change in computer orientation (for example, from an upright to a rack configuration), you can reconfigure the external drive bays to remain horizontal as follows:

1. Remove the front-panel inserts from the front bezel.
2. Reposition the plastic frame surrounding the drive opening in the front bezel:
    a. Facing the inside of the front bezel, press against the center of the frame with your thumbs until the frame bows sufficiently to loosen the tabs on the sides of the insert. Pull the frame out of the bezel.
    b. Rotate the frame 90 degrees to match the new orientation of the drives.
    c. Replace the frame in the front bezel and carefully press it into place.
3. Reinstall the front-panel inserts to match the new drive orientation.
4. Remove the computer cover and slide the system board tray out to the service position.
5. Remove the external drives from the drive bays (noting all cable connections); remove any metal inserts covering empty drive bays.
6. Reinstall the external drives to match the new system orientation, and reconnect cables as appropriate.
7. Close the system board tray.
8. Replace the front bezel and computer cover.

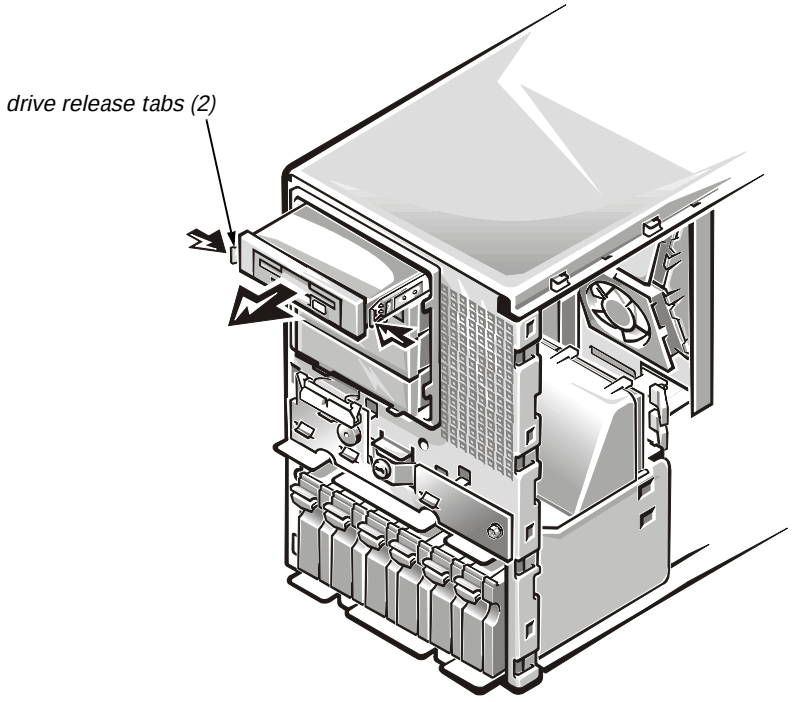


Figure 4-6. Externally Accessible Drive Removal

To remove a 3.5-inch or 5.25-inch drive assembly from one of the externally accessible drive bays, follow these steps:

1. Press the two drive release tabs toward the center of the drive, and slide the drive out the front of the bay (see Figure 4-6).

2. Disconnect the DC power cable and the interface cable from the back of the drive.

   Be sure to record the power connector number and the location of the interface cable connector.

3. Remove the drive-mounting rails from the drive (see Figure 4-7).

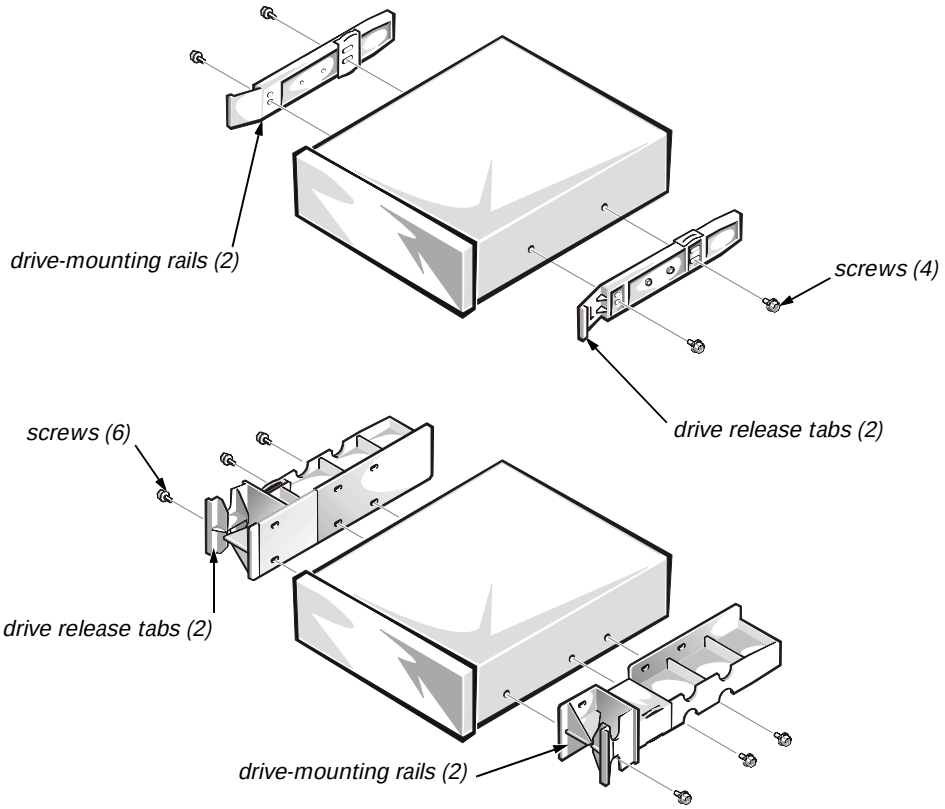


Figure 4-7. Drive-Mounting Rail Removal (Example)

4. If the drive is a SCSI drive, record the setting of the SCSI address jumpers and SCSI bus termination jumper.

5. If the drive is a SCSI drive, remove the 50-pin-to-68-pin adapter from the SCSI connector on the back of the drive (if present).

   Some drives use a 50-pin-to-68-pin adapter between the SCSI cable and the drive connector. Check the back of the drive for an adapter; if one is present, remove it and retain it for use on the new drive.

NOTES: When you install a drive, install the drive rails and slide the drive into its bay until the rails snap securely into place.

When you reinstall a SCSI drive, set the SCSI address jumpers and the SCSI bus termination jumpers to the settings you recorded when you removed the drive.

Hard-Disk Drives in External Bay

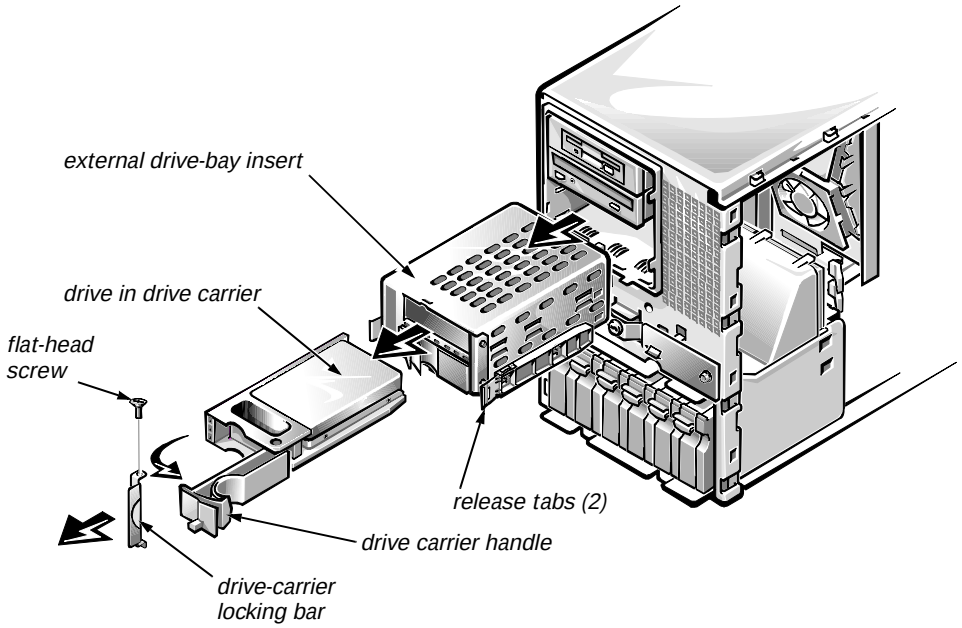


Figure 4-8. Hard-Disk Drives in External Bay

Two SCSI hard-disk drives can be installed in the external bay using the external drive-bay insert (see Figure 4-8). Drives mate to a small backplane board on the back of the insert; from there, they can be connected via a two-device ribbon cable either to a RAID controller or to the Ultra2/LVD SCSI connector on the system board.

CAUTION: Hot-pluggable drive installation and removal is *not* supported for hard-disk drives installed in the external drive bay. Removing a drive while the system is turned on will result in a loss of data.

Remove a SCSI hard-disk drive from the external drive bay as follows:

1. Press inward on the two release tabs on the drive bay insert, and pull the insert about one inch out of the external bay.
2. Use a flat-blade screwdriver to remove the screw that secures the locking bar on the front of the insert, and remove the locking bar.
3. Open the drive carrier handle to release the carrier, and slide the carrier toward you and out of the insert.

When installing a drive in the insert, slide the drive in with the handle open until it stops, and then push the handle closed and slide the drive in the rest of the way. Replace the locking bar before installing the insert into the chassis.

If you are not replacing the drive, install a metal close-out panel on the front of the external bay or a front-panel insert on the front bezel.

Hard-Disk Drives

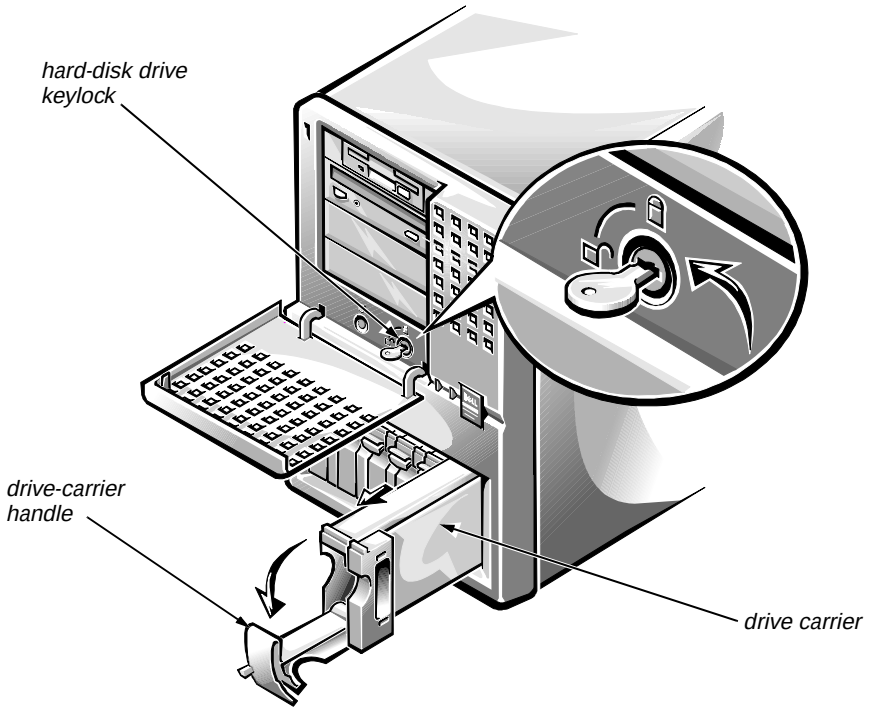


Figure 4-9. Hard-Disk Drive Removal

Remove a SCSI hard-disk drive from an internal drive bay as follows.

CAUTION: Hot-pluggable drive installation and removal is *not* supported for systems *without* a Dell PowerEdge Expandable RAID Controller host adapter card. Removing a drive without turning the system off in this situation will result in a loss of data.

1. If the system does not have a PowerEdge Expandable RAID Controller card installed, shut down the system and go to step 3.
2. For systems with a PowerEdge Expandable RAID Controller card, refer to the RAID controller documentation for information on preparing the drive for removal. When the drive has been powered down, wait until the drive status indicators adjacent to the drive bay signal that the drive may be removed safely.

   If the drive has been online, the drive status indicators flash sequentially as the drive is powered down. When all indicators are turned off, the drive is ready for removal.
3. Unlock the hard-disk drive keylock (see Figure 4-9).
4. Squeeze the open side of the drive carrier handle to release it, open the handle, and slide the carrier toward you until it is free of the drive bay.

5. Remove the drive from its carrier by removing the four screws (two on each side) that secure it in the carrier.

Before installing a new drive, set all jumpers and remove termination from the drive. When installing the drive, raise the carrier handle until it latches to ensure that the drive is fully seated in the backplane board.

SCSI Backplane Board

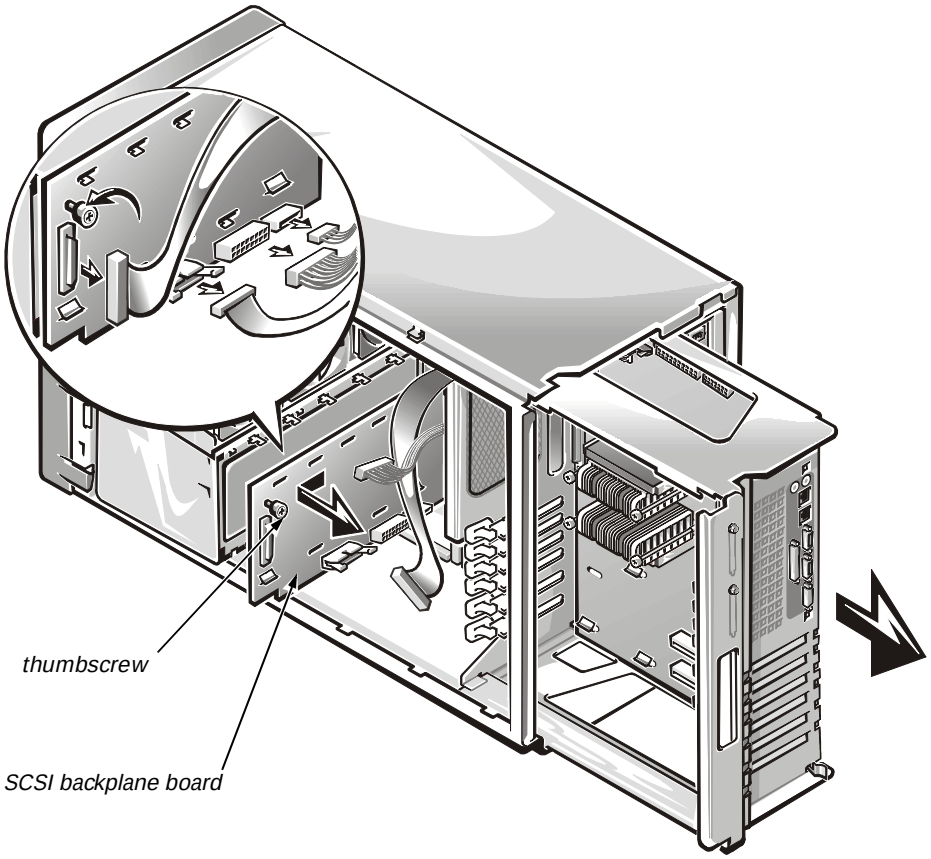


Figure 4-10. SCSI Backplane Board Removal

To remove a SCSI backplane board, follow these steps:

1. Slide the system board tray out to the service position.

   See "Accessing the Interior of the System" in Chapter 1 for instructions.

2. Remove the hard-disk drives.

3. Disconnect all cables from the SCSI backplane board, noting where the cables are connected.

4. Loosen the thumbscrew on the backplane board (see Figure 4-10).

5. Slide the backplane board away from the power-supply paralleling board (PSPB) about a quarter inch, and lift it off the L-shaped mounting tabs on the hard-disk drive cage.

CAUTION: If you remove power from the SCSI backplane board (either by removing the power cable or during replacement of the system board battery), you may need to reflash the system's firmware.

The original firmware on the SCSI backplane is stored in EEPROM. However, if the SCSI backplane firmware is ever updated, the update is stored in volatile RAM. If power is removed from an updated backplane board, the update is lost and the board reverts to its original firmware in EEPROM.

If at system startup you receive the message `Warning: Firmware is out-of-date, please update...` **, Dell recommends that you reflash *all* system firmware from the *Dell Server Assistant* CD.**

System Power Supply

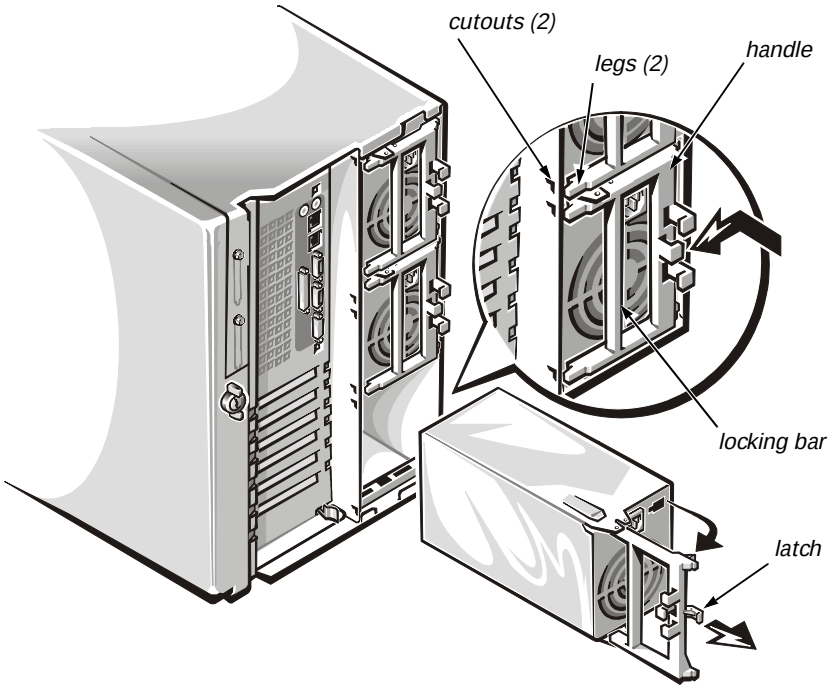


Figure 4-11. Power Supply Removal

WARNING: For systems with nonredundant power supplies, turn off power to the system before removing the system power supplies.

To remove a power supply, follow these steps:

1. Disconnect the AC power cable from the electrical outlet, and then disconnect the other end of the cable from the power supply.
2. Press the locking bar in the power supply handle to the left (or up if the system is in the rack-mount position) until the latch disengages from the chassis (see Figure 4-11).
3. Rotate the handle outward (forcing the power supply partially out of its bay) and pull the power supply the rest of the way out by the handle.

When installing a power supply, make sure the handle is all the way out (at a right angle to the back of the power supply). Slide the power supply *almost* all the way into its bay, letting it extend out about a quarter of an inch. Rotate the handle back toward the power supply while fitting the two legs of the handle into the cutouts in the chassis wall and, at the same time, pressing the power supply the rest of the way into the bay. Then push the locking bar to the right (or down if the system is in the rack-mount position) until the latch snaps into place, securing the power supply.

CAUTION: The power supply will not operate unless the handle is snapped all the way into the locked position.

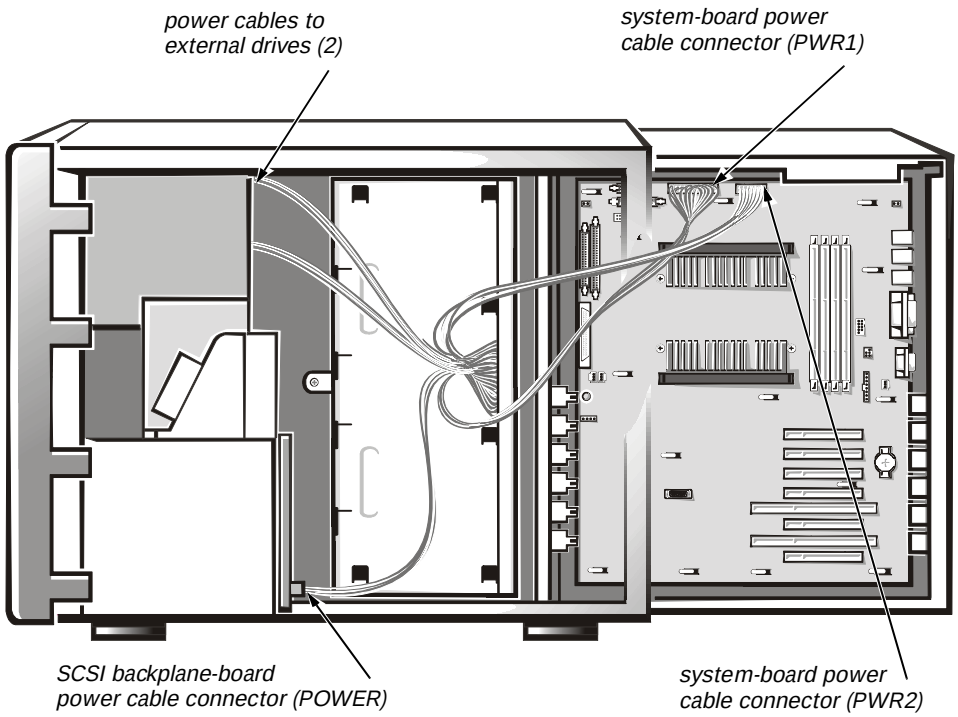


Figure 4-12. Power Cable Connections — Single Power Supply

WARNING: For systems with nonredundant power supplies, turn off power to the system before removing the system power supplies.

If you have a single power-supply configuration (when available as an option) for your Dell PowerEdge 4300 system, follow these steps to upgrade a computer with a PSPB and additional power supplies:

1. Remove the power supply.
2. Slide the system board tray out of the chassis to the service position.

   See "Accessing the Interior of the System" in Chapter 1 for instructions.
3. Disconnect the power cable harness from the POWER connector on the SCSI backplane board, from the PWR1 and PWR2 connectors on the system board, and from the diskette drive and other drives in the external drive bay (see Figure 4-12).

   When disconnecting the cables from the SCSI backplane board and the system board, press the plastic latch on one side of the connector to release it.

4. Remove the screw securing the PSPB tray to the chassis (see Figure 4-13).

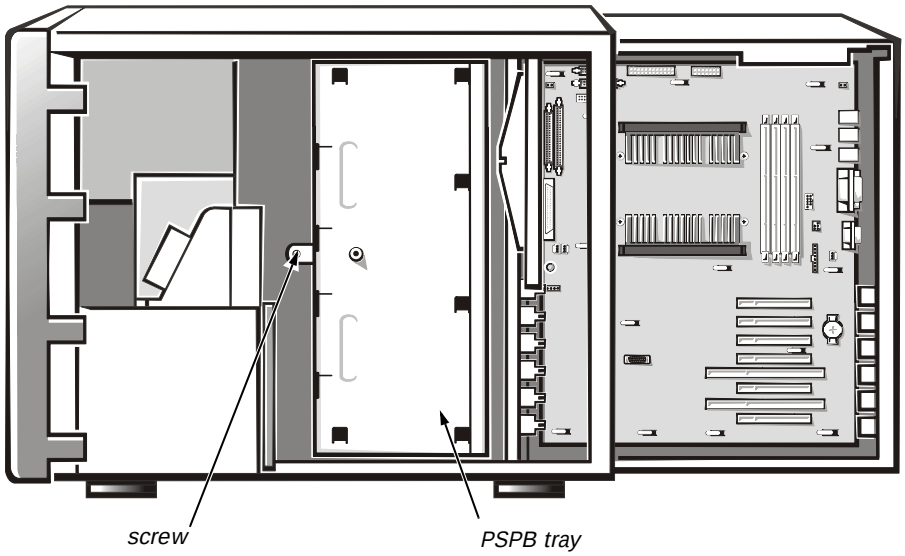


Figure 4-13. PSPB Tray Location in the System Chassis

5. Remove the PSPB tray from the chassis.

   If necessary, temporarily disconnect the SCSI interface cables from the system board to allow removal of the tray.

6. Remove the power cable harness from the PSPB tray by compressing the two retention tabs on both of the connector-mounting posts.

7. Install the three Y-cables in the PSPB tray.

   To install a cable, insert the connector through the opening in the PSPB tray until the retention tabs on the mounting posts lock the connector into place.

8. Install the PSPB on the PSPB tray as follows (see Figure 4-14):

   a. While holding the PSPB by its edges, position the PSPB so that the tabs on the PSPB tray fit through the corresponding slots in the PSPB.

   b. Slide the PSPB toward the front of the tray a quarter of an inch (about one centimeter).

   c. Secure the PSPB by tightening the captive screw.

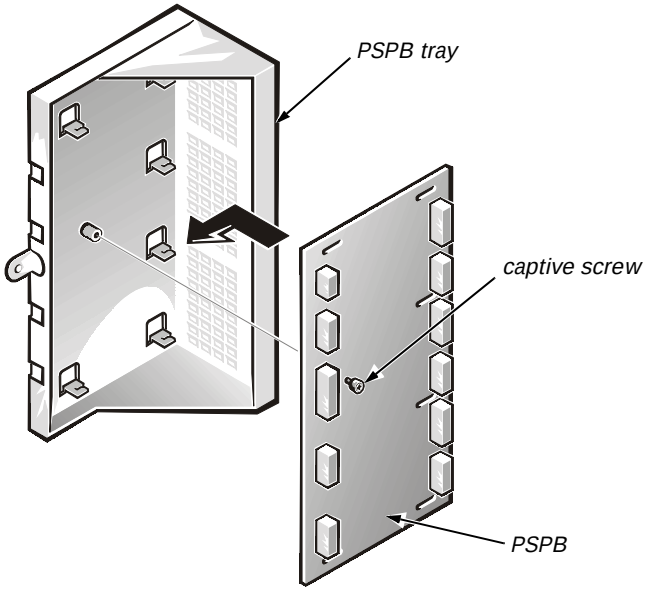


Figure 4-14. PSPB Installation on the PSPB Tray

9. Connect the three Y-cables to the corresponding three pairs of connectors on the PSPB.

10. Reinstall the PSPB tray in the chassis.

    Secure the tray with the screw you removed in step 4.

11. Attach the four-conductor power cable to the external-drive power cable connector (labeled "FD") on the PSPB (see Figure 1-7), and to the drives in the external drive bays (see Figure 4-15).

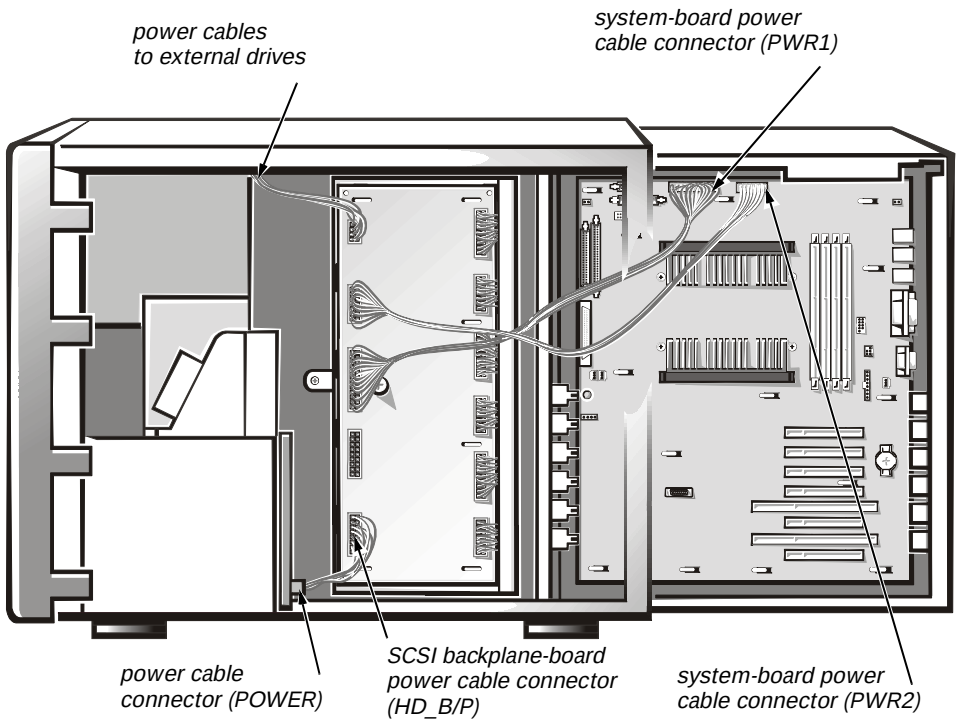


Figure 4-15. Power Cable Connections — Multiple Power Supplies

12. Attach the nine-conductor power cable labeled "HDBP" to the SCSI backplane-board power cable connector (HD_B/P) on the PSPB and to the power connector (POWER) on the SCSI backplane board (see Figure 1-7 and Figure 4-15).

13. Attach the system-board power cable connectors labeled "PWR1" and "PWR2" to the corresponding connectors on the PSPB and system board (see Figure 1-7 and Figure 4-15).

14. If you disconnected any SCSI interface cables in step 5, connect those cables to the system board.

15. Slide the system board tray back into the chassis.

16. Reinstall the primary power supply.

17. Install the additional power supply or supplies.

Power-Supply Paralleling Board

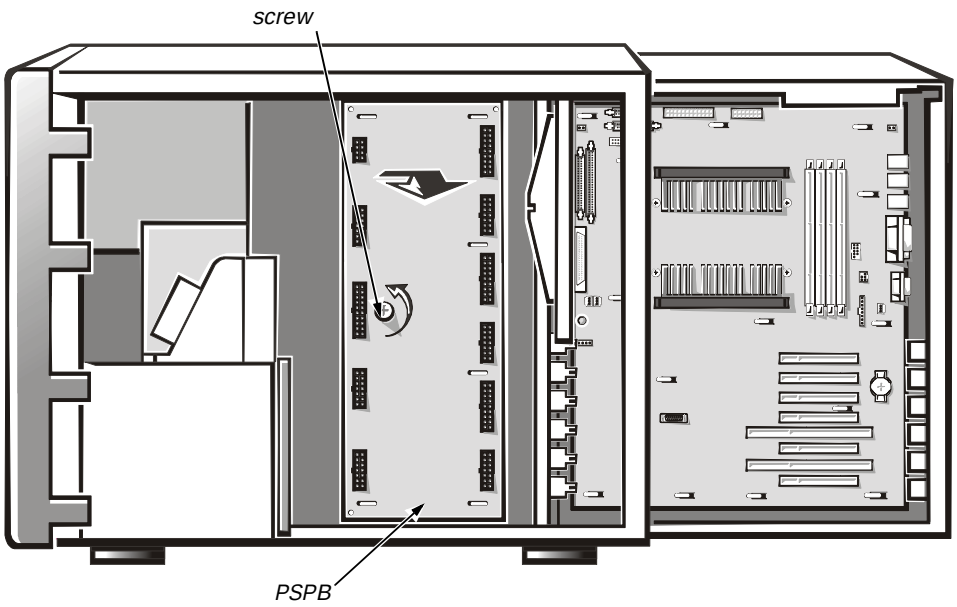


Figure 4-16. Power-Supply Paralleling Board Remova l

Remove the PSPB as follows:

1. Slide the system board tray out to the service position.

   See "Accessing the Interior of the System" in Chapter 1 for instructions.

2. Disconnect all power harnesses and cables from the PSPB.

3. Loosen the captive screw securing the PSPB to the chassis wall (see Figure 4-16).

4. Slide the PSPB toward the power supplies about a quarter of an inch until it disengages from the hooked tabs in the chassis wall, and lift it out.

When installing a replacement PSPB, position the PSPB against the chassis wall so that the tabs on the chassis wall fit through the corresponding slots in the PSPB, slide the PSPB toward the front of the chassis until it is firmly engaged in the tabs, and tighten the screw.

When replacing the power harnesses and cables, refer to "PSPB and System Power Supplies" in Chapter 1 for cable routing information.

System Cooling Fans

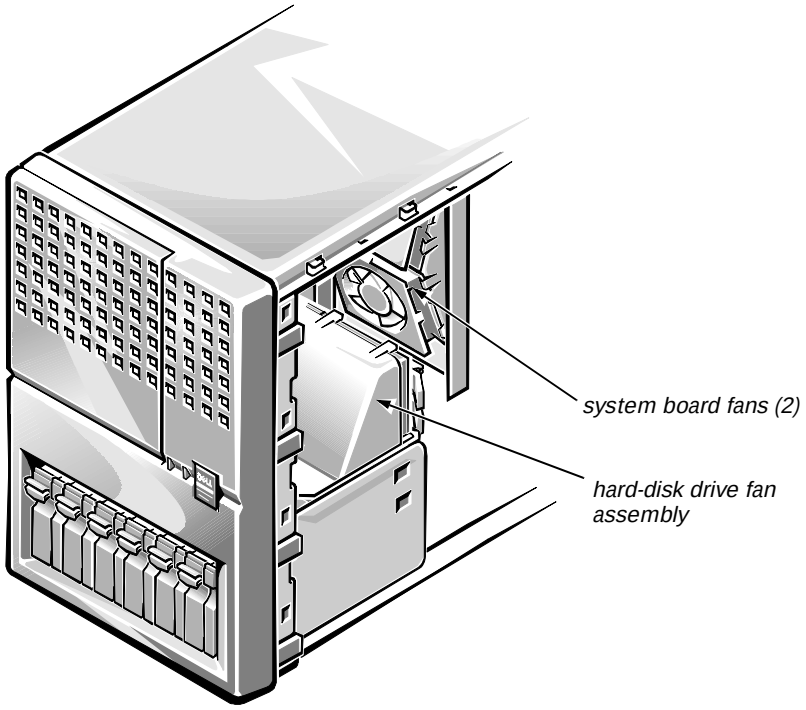


Figure 4-17. System Cooling Fans

Five cooling fans are installed in the Dell PowerEdge 4300 chassis. The drive fan assembly consists of three fans mounted in a carrier above the hard-disk drive enclosure; the system-board fan assembly consists of two fans mounted in a carrier on the inner wall of the system board tray (see Figure 4-17). The drive fan assembly is hot-pluggable and must be replaced as a unit. The system board fans are individually hot-pluggable.

Three-Fan Assembly

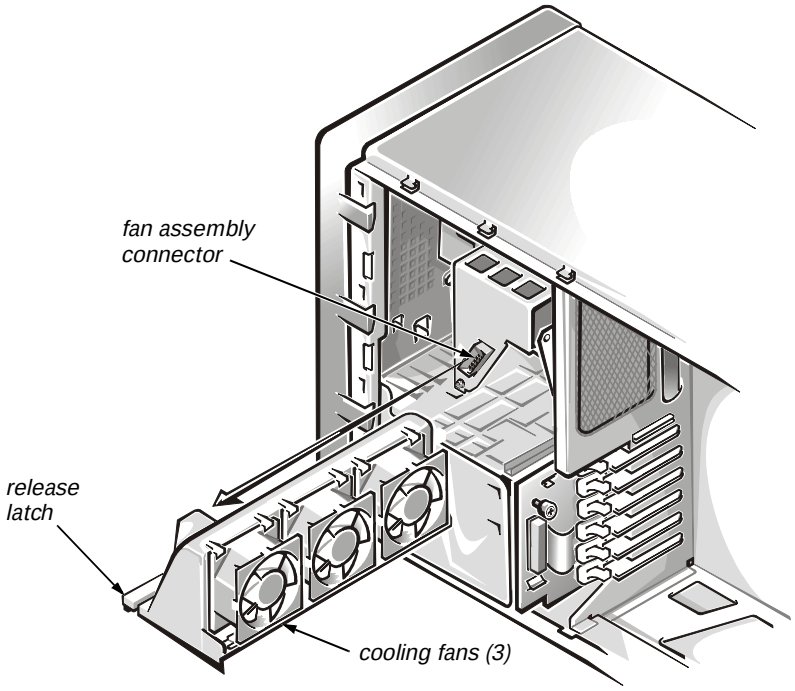


Figure 4-18. Three-Fan Assembly Removal

The drive fan assembly is hot-pluggable and can be quickly replaced while the system is running.

WARNING: If replacing this assembly while the system is running, make sure you have the new assembly handy, and perform the procedure quickly to avoid overheating the drives.

Follow these steps to remove a drive fan assembly:

1. If replacing the drive fan assembly while the system is running, have the new fan assembly ready.
2. Lift up on the release latch on the back of the three-fan assembly (see Figure 4-18) and slide the assembly out of the system.
3. Slide the replacement assembly into the system, making sure that the electrical connector is fully seated.

   The cooling fans should be operating.

Fan Power-Cable Bundle

*NOTE: This is **not** a hot-pluggable procedure.*

To remove the power cable bundle that mates to the bottom of the drive fan assembly, follow these steps:

1. Remove the drive fan assembly.
2. Squeeze the ends of the power-cable bundle connector while pulling the cable (from the connector) out from under the metal support bracket.
3. Disconnect the other end of the cable from the FAN connector on the SCSI backplane.

Drive Fan

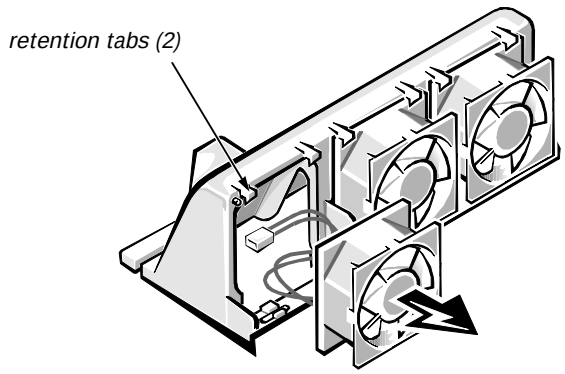


Figure 4-19. Drive Fan Removal

*NOTE: This is **not** a hot-pluggable procedure.*

To replace a faulty fan in a drive fan assembly before storing the assembly for future use, follow these steps:

1. Remove the faulty fan from the fan carrier by releasing the two retention tabs that secure the fan in the carrier (see Figure 4-19) and working the fan out of the carrier.
2. Remove the fan's power cable from the carrier's power harness bundle.
3. Use the push fasteners that came with the new fan to install the metal finger guard on the fan. Install the guard so that the fan's airflow arrow points toward the guard.
4. Connect the new fan's cable to the carrier's power harness bundle.
5. Insert the new fan into the carrier under the two retention tabs.

System Board Fans

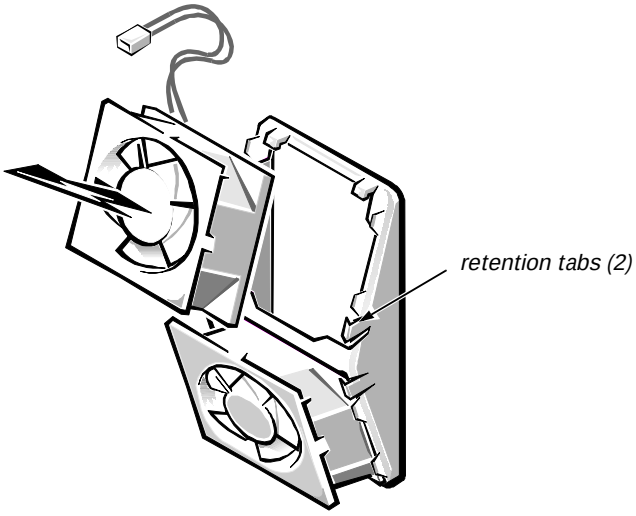


Figure 4-20. System-Board Fan Removal

The system board fans are hot-pluggable and can be quickly replaced while the system is running.

WARNING: If replacing this assembly while the system is running, make sure you have the new fan assembled and handy, and perform the procedure quickly to avoid overheating the microprocessor(s).

1. Assemble the new fan.

   Use the push fasteners that came with the new fan to install the finger guard on the fan. Install the guard so that the fan's airflow arrow points away from the guard.

2. Slide the system board tray out to the service position.

   See "Accessing the Interior of the System" in Chapter 1 for instructions.

3. On the fan to be replaced, disconnect the cable from the extension cable attached to the appropriate fan connector (FAN1 or FAN2) on the system board.

4. Pull outward on the fan-retention tabs to disengage the fan (see Figure 4-20).

To install the new fan, slide the fan into the fan housing, align the holes in the corners of the fan with the studs in the housing, and snap the fan into place. Connect the fan to the appropriate extension cable.

System Board Components

The subsections that follow contain procedures for removing system board components. Refer to Figure 4-21 for the location of components.

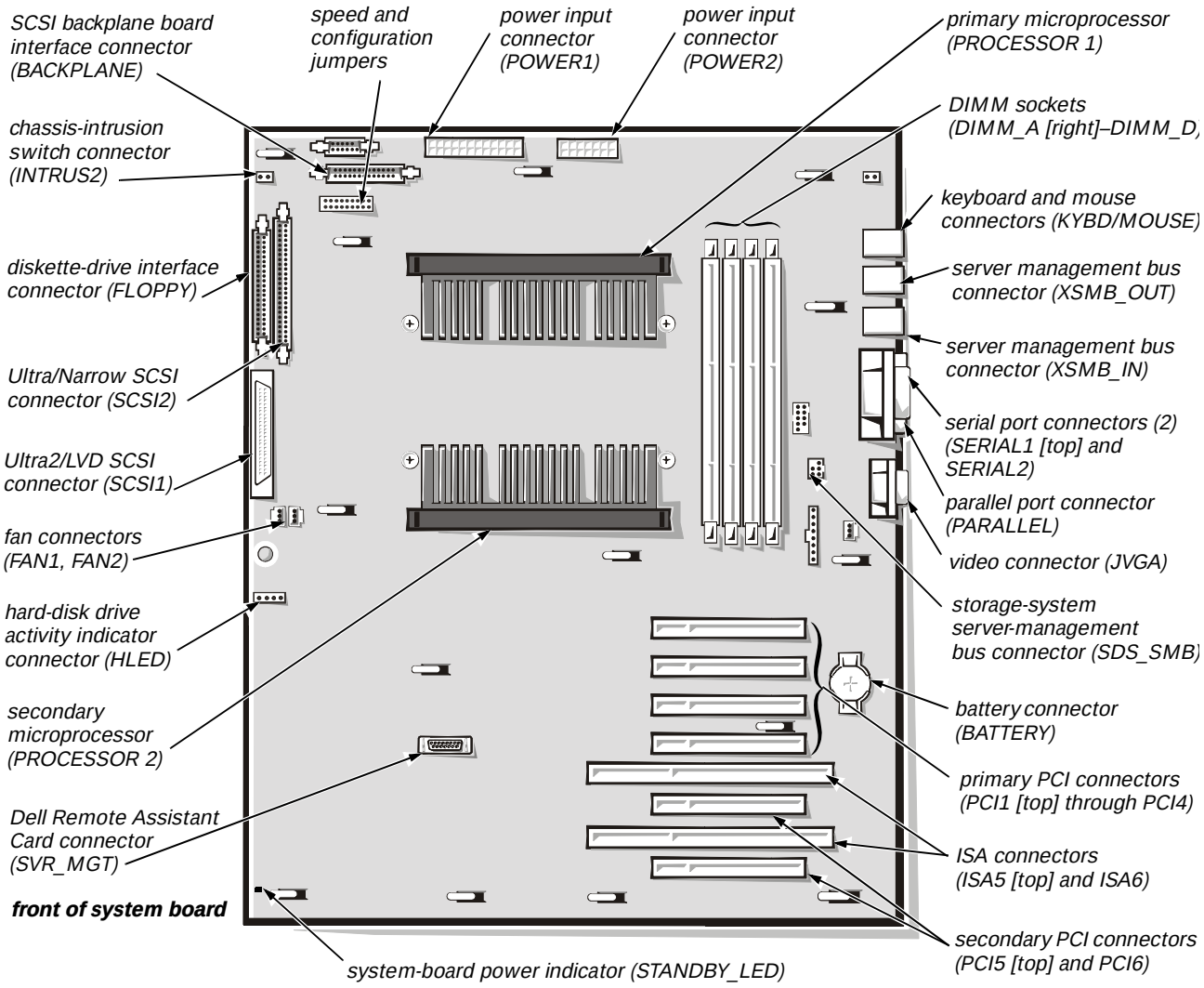

SCSI backplane board interface connector (BACKPLANE)
speed and configuration jumpers
power input connector (POWER1)
power input connector (POWER2)
primary microprocessor (PROCESSOR 1)
DIMM sockets (DIMM_A [right]–DIMM_D,
chassis-intrusion switch connector (INTRUS2)
keyboard and mouse connectors (KYBD/MOUSE)
diskette-drive interface connector (FLOPPY)
server management bus connector (XSMB_OUT)
server management bus connector (XSMB_IN)
Ultra/Narrow SCSI connector (SCSI2)
serial port connectors (2) (SERIAL1 [top] and SERIAL2)
Ultra2/LVD SCSI connector (SCSI1)
parallel port connector (PARALLEL)
fan connectors (FAN1, FAN2)
video connector (JVGA)
storage-system server-management bus connector (SDS_SMB)
hard-disk drive activity indicator connector (HLED)
battery connector (BATTERY)
secondary microprocessor (PROCESSOR 2)
primary PCI connectors (PCI1 [top] through PCI4)
Dell Remote Assistant Card connector (SVR_MGT)
ISA connectors (ISA5 [top] and ISA6)
front of system board
secondary PCI connectors (PCI5 [top] and PCI6)
system-board power indicator (STANDBY_LED)

Figure 4-21. System Board Components

Expansion Cards

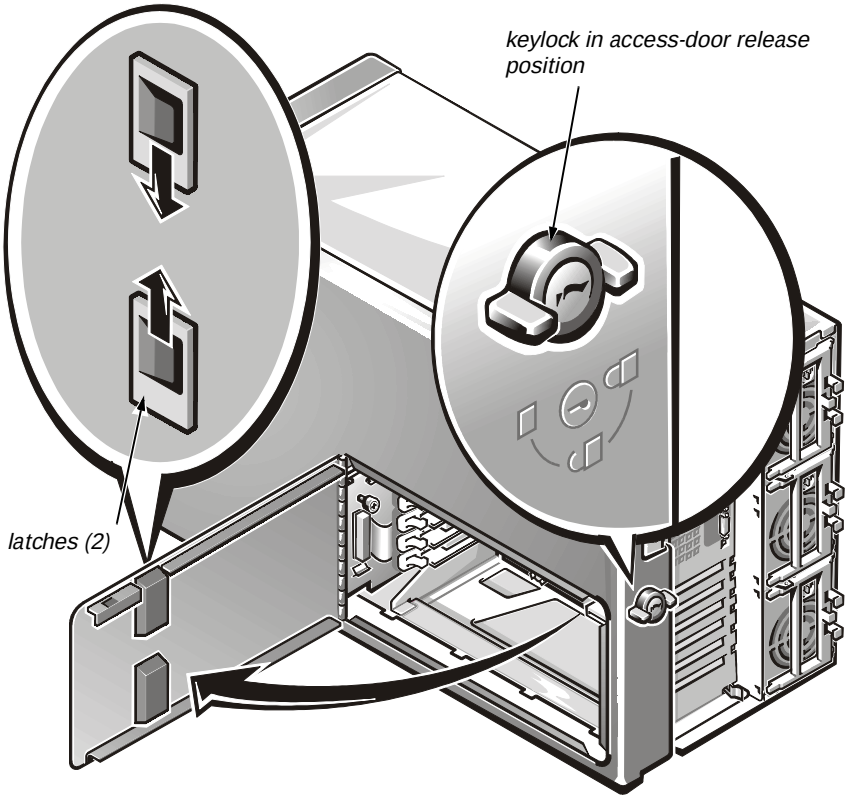


Figure 4-22. Expansion-Card Access Door

To remove an expansion card, follow these steps:

1. Unlock the keylock, remove the key, and then turn the keylock to the access-door release position (see Figure 4-22).
2. Squeeze the dual latches on the expansion-card access door to open the door, exposing the expansion-card compartment.
3. Record the location of any cables attached to the expansion card you want to remove, and then disconnect the cables.

CAUTION: Do *not* use a tool to force open the release tab in the middle of the expansion-card latch.

4. For the card you want to remove, press in and hold the clip on the back of the computer. At the same time, from inside the computer, press the *curved release tab in the middle of the expansion-card latch* toward the bottom of the card. After the release tab clicks into the latch cutout, rotate the latch away from the expansion-card bracket (see Figure 4-23).

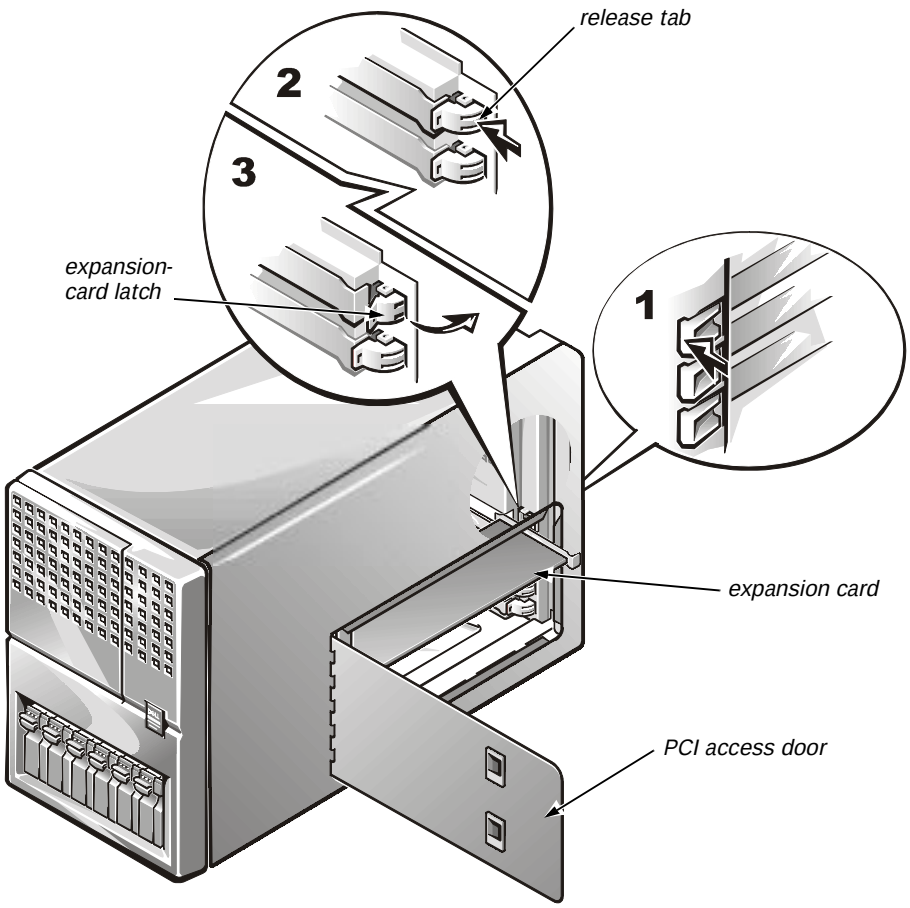


Figure 4-23. Expansion Card Removal

5. Release the inner end of the expansion card by pressing outward on the latch at the inner corner of the card.

6. Grasp the expansion card by its corners and carefully remove it from the expansion-card connector.

To install an expansion card, insert the card firmly into its connector and make sure the securing clips on both ends of the card (when applicable) are in place. Secure the clip on the back of the computer by pressing firmly inward until the release lever on the inside clicks into place.

Interior Support Panel

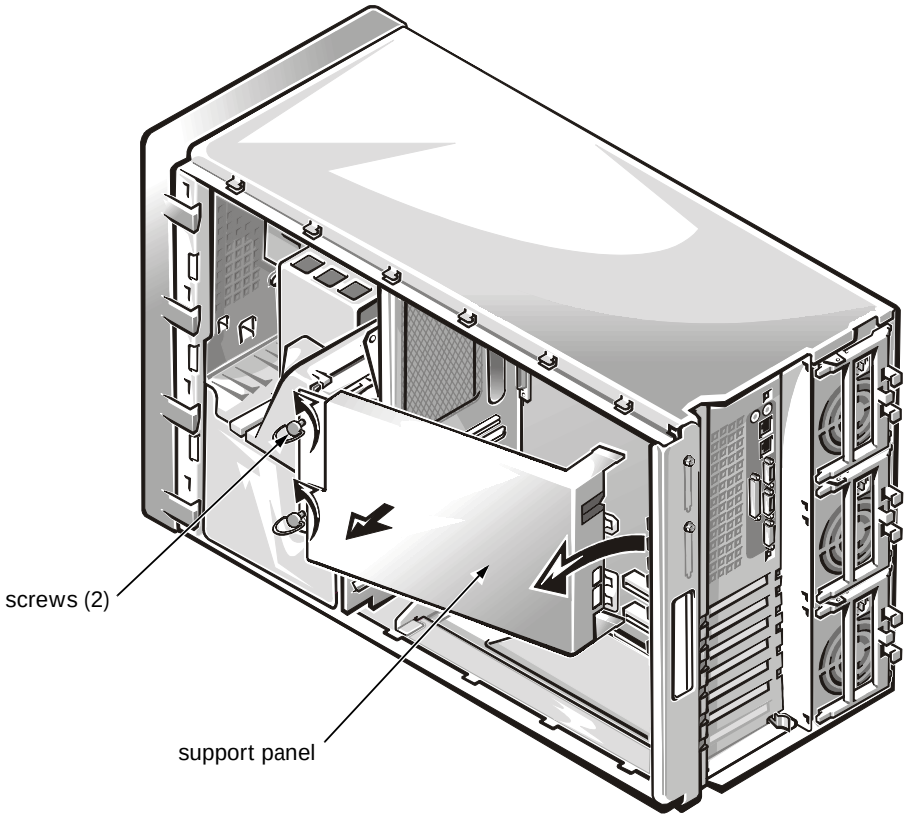


Figure 4-24. Interior Support Panel Removal

To access the microprocessors or the memory module, you must remove the interior support panel as follows:

1. Loosen the thumbscrews on the left side of the panel (see Figure 4-24).
2. Rotate the panel outward slightly, and lift the hinge side of the panel to clear the tabs from the hinge slot.

DIMMs

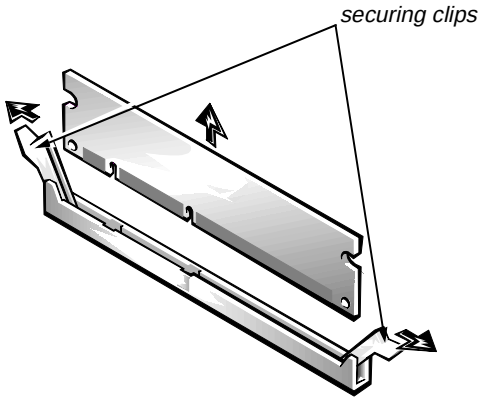


Figure 4-25. DIMM Removal

To remove a DIMM, follow these steps:

1. Remove the interior support panel.
2. Press outward on the socket's securing clips until the DIMM is released from the socket (see Figure 4-25). Then, lift the DIMM away from the socket.

To replace a DIMM, press outward on the securing clips until they snap open (see step 1 in Figure 4-26). Align the notches in the DIMM to the crossbars in the socket, and press down on the outer edges of the DIMM while pulling up on the securing clips until the clips lock around the ends of the DIMM (see step 2 in Figure 4-26).

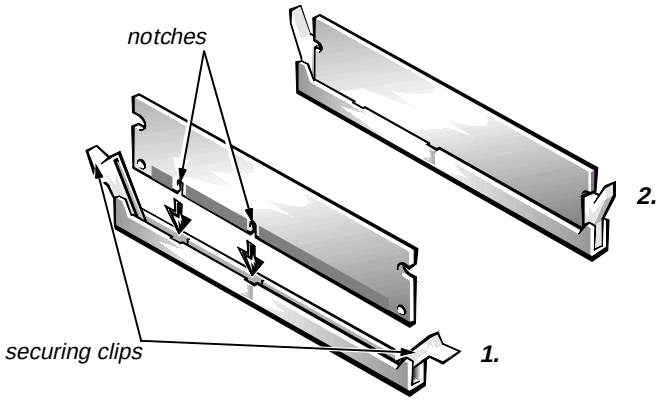


Figure 4-26. DIMM Installation

SEC Cartridge and Heat Sink Assembly

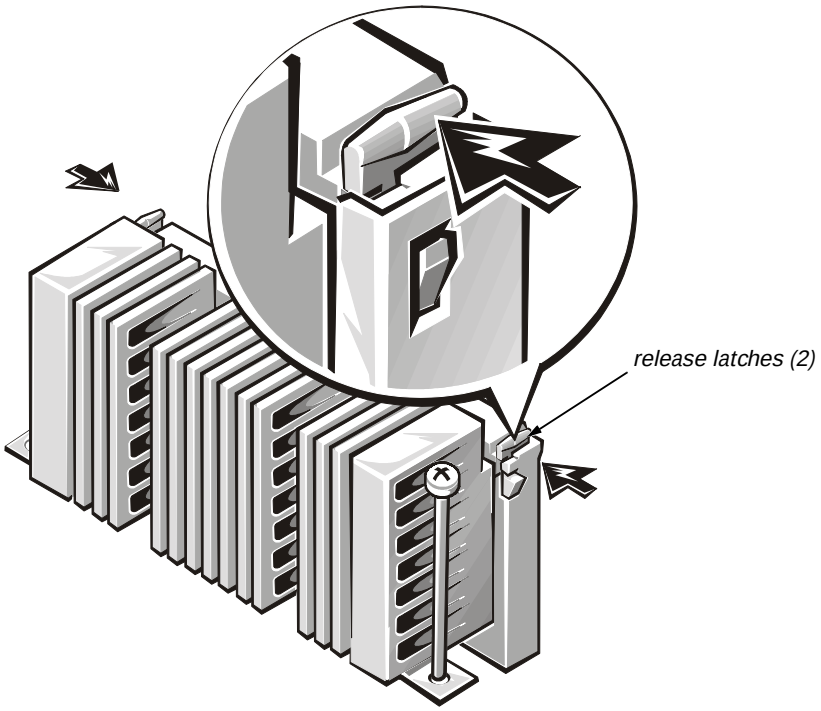


Figure 4-27. SEC Cartridge Release Latches

To remove an SEC cartridge and heat sink assembly, follow these steps.

WARNING: The SEC cartridge and heat sink assembly can get extremely hot during system operations. Be sure that it has had sufficient time to cool before touching it.

WARNING: When handling the SEC cartridge and heat sink assembly, take care to avoid sharp edges on the heat sink.

1. On the unit to be removed, press inward on the two SEC cartridge release latches until they snap into the open position (see Figure 4-27).

2. Remove the two retention pins from the SEC cartridge and heat sink assembly (see Figure 4-28).

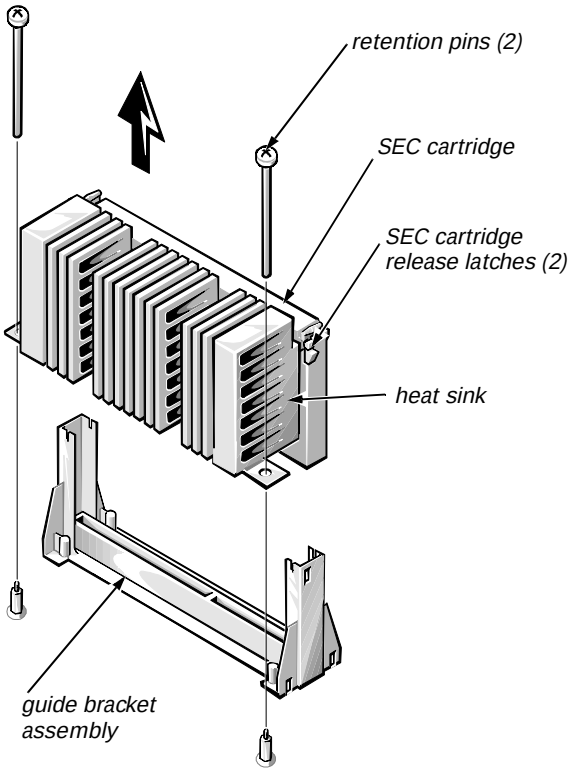


Figure 4-28. SEC Cartridge and Heat Sink Removal

3. Pull the SEC cartridge straight up out of the connector and guide bracket assembly (some force may be required).

To replace an SEC cartridge, make sure the cartridge release latches are in the open position, orient the new SEC cartridge in the guide bracket assembly (as shown in Figure 4-28) and seat it firmly, and then snap the release latches back into place. Reinstall the two retention pins.

To install an SEC cartridge where there was none before, you will need to remove the installed terminator card (see the next subsection, "Terminator Card").

*NOTE: Do **not** attempt to operate the system with the microprocessor set to a speed other than the specified rating.*

Terminator Card

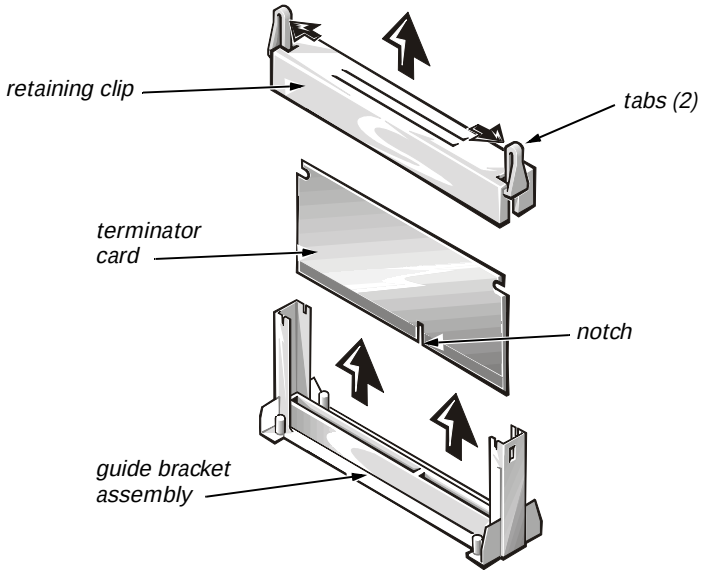


Figure 4-29. Terminator Card Removal

To remove a terminator card, follow these steps:

1. Remove the retaining clip from the guide bracket assembly.

   Using the thumb and forefinger of each hand, pinch the tabs at each end of the clip (see Figure 4-29), and then lift the clip straight up.

2. Remove the terminator card.

   Hold the card by its edges, and lift the card straight up from the guide bracket assembly.

System Battery

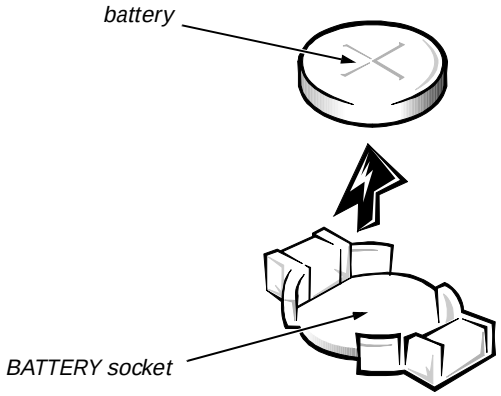


Figure 4-30. System Battery Removal

WARNING
There is a danger of the new battery exploding if incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

To remove the system battery, follow these steps:

1. Before turning off the system, enter the System Setup program if possible and make a printed copy of the System Setup screens (see Appendix A).
2. Remove any expansion cards that block access to the battery.
3. Remove the battery (see Figure 4-30) by prying it out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.

To replace the system battery, orient the new battery with the "+" facing up. Insert the battery into its socket and snap it into place. When prompted during the boot routine, press <Ctrl><Alt><Enter> to enter the System Setup program and compare the system configuration information with the copy of the system configuration settings you made in step 1. Restore any system configuration information that was lost while the battery was being replaced.

NOTE: As a result of the power loss while replacing the battery, you may lose portions of the current system firmware. If, after replacing the system battery, you receive the message `Warning: Firmware is out-of-date, please update...`*, reflash the system firmware from the Dell Server Assistant CD (if available) or download it from the Dell Web site at* ***www.dell.com****.*

System Board Assembly

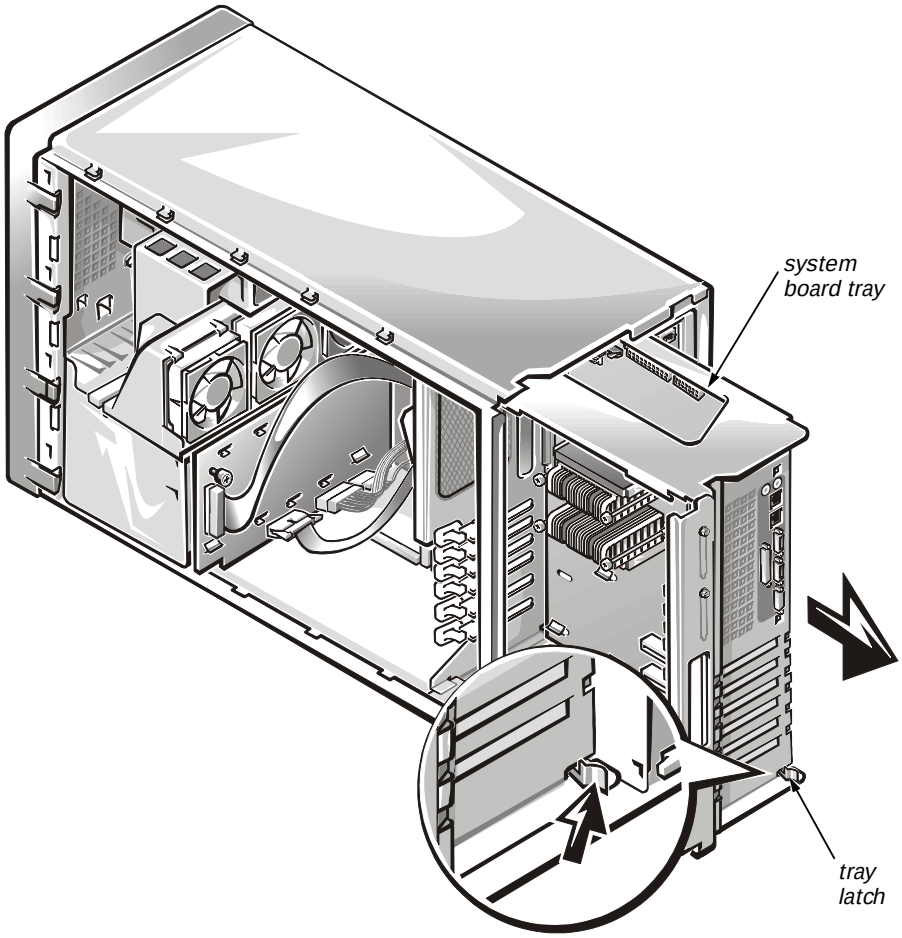


Figure 4-31. System-Board Assembly Removal

The system board assembly consists of the system board and a mounting plate. The system board is held to the mounting plate with screws and mounting clips.

To remove the system board assembly, follow these steps:

1. Disconnect all cables from the system board.

   Be sure to record where each cable is attached.

2. To remove the system board tray, first release the tray latch at the lower-back corner of the tray (see Figure 4-31) and pull the tray open to the service position. Then depress the latch again and pull the tray out of the chassis.

System Board

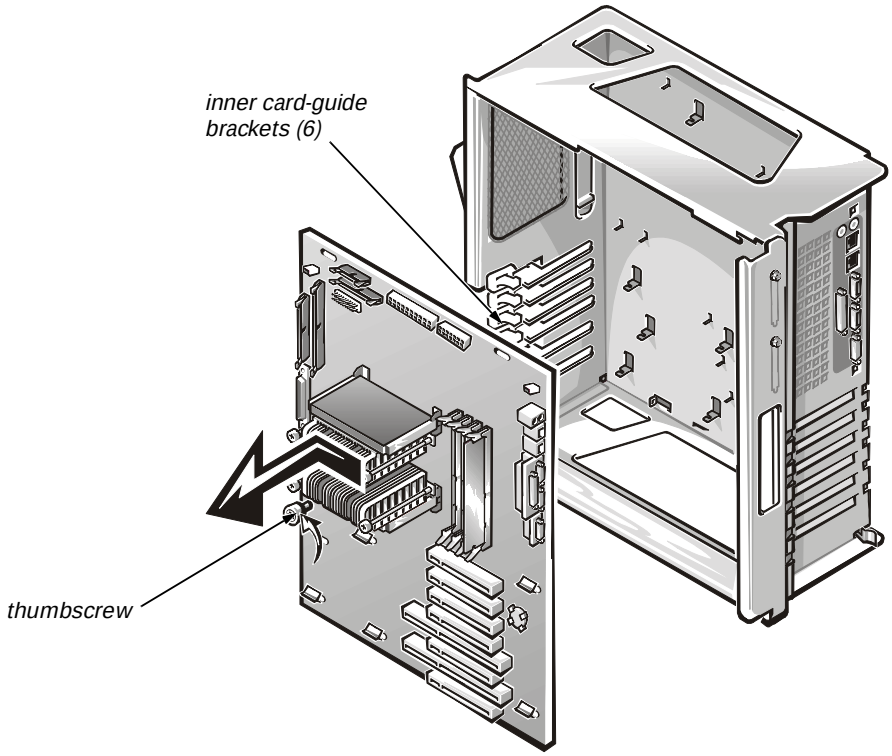


Figure 4-32. System Board Removal

To remove the system board from the system board tray, perform the following steps. (If you are replacing the system board, you may want to remove the expansion cards, memory, processors, and processor guides and install them on the replacement system board.)

1. Remove the system board assembly.
2. Note the slot numbers of any expansion cards you are migrating to the new system board so that you can install them in the same slots on the new board.
3. Remove the system board components you are migrating to the new system board.
4. Loosen the thumbscrew securing the system board to the tray (see Figure 4-32).
5. Slide the system board to the left as shown in Figure 4-32 (toward the *inner* expansion-card guide brackets) about a half inch to clear the chassis hooks, and remove the board.

If you are replacing the system board, install any components you removed from the old system board onto the replacement board. To retain the same system configuration and appropriate resource sharing, install PCI expansion cards in the same slots they were in on the old system board. Verify that the jumper settings on the new system board are correct.

Guide Bracket Assembly

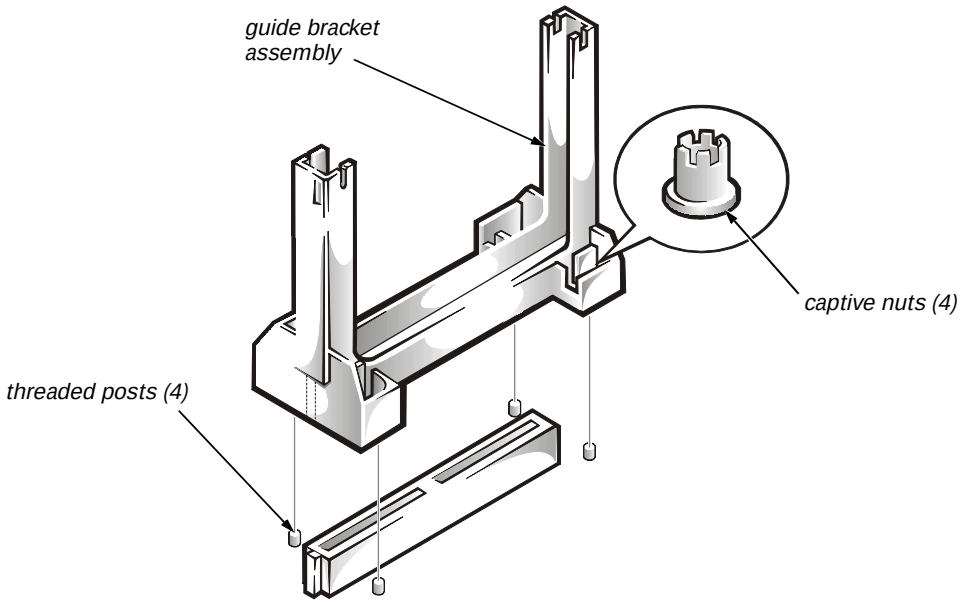


Figure 4-33. Guide-Bracket Assembly Removal

To remove the guide bracket assembly, follow these steps:

1. Remove the system board assembly.
2. Remove any terminator card, if necessary.
3. Remove any SEC cartridge and heat sink assembly, if necessary.
4. Loosen the four captive nuts that secure the guide bracket assembly to the system board (see Figure 4-33).
5. Lift up the assembly and remove it from the four threaded posts.

APPENDIX A
System Setup Program

This appendix describes the System Setup program, which is used to change the system configuration information stored in NVRAM on the system board. For in-depth information, refer to Chapter 4, "Using the System Setup Program" in the *Dell PowerEdge 4300 Systems User's Guide*.

To enter the System Setup program, follow these steps:

1. Turn on (or reboot) the system.
2. Press <Ctrl><Alt><Enter> immediately after you see the message `Press <Ctrl><Alt><Enter> for System Setup`.

   If you wait too long, the operating system begins to load into memory, the message disappears, and you cannot enter the System Setup program. *Let the system complete the load operation*; then shut down the system and try again.

NOTE: To ensure an orderly system shutdown, consult the documentation that accompanied the operating system.

System Setup Screens

Figure A-1 illustrates the System Setup program screens, and Table A-1 briefly describes each setup option.

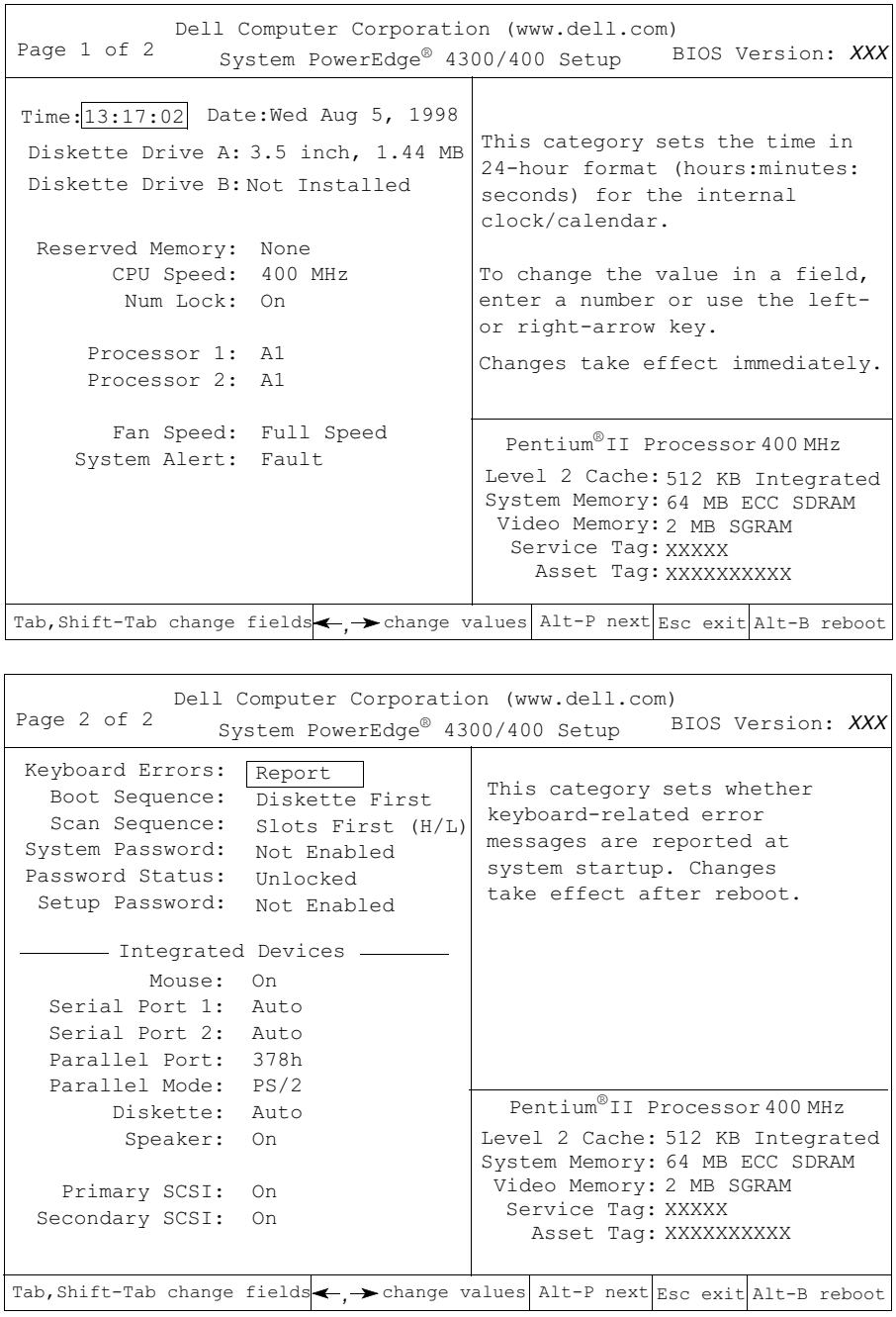

Page 1 of 2
Dell Computer Corporation (www.dell.com)
System PowerEdge® 4300/400 Setup
BIOS Version: XXX
Time: 13:17:02 Date: Wed Aug 5, 1998
Diskette Drive A: 3.5 inch, 1.44 MB
Diskette Drive B: Not Installed
Reserved Memory: None
CPU Speed: 400 MHz
Num Lock: On
Processor 1: A1
Processor 2: A1
Fan Speed: Full Speed
System Alert: Fault
This category sets the time in 24-hour format (hours:minutes: seconds) for the internal clock/calendar.
To change the value in a field, enter a number or use the left- or right-arrow key.
Changes take effect immediately.
Pentium®II Processor 400 MHz
Level 2 Cache: 512 KB Integrated
System Memory: 64 MB ECC SDRAM
Video Memory: 2 MB SGRAM
Service Tag: XXXXX
Asset Tag: XXXXXXXXXX
Tab, Shift-Tab change fields
←, → change values
Alt-P next
Esc exit
Alt-B reboot
Page 2 of 2
Dell Computer Corporation (www.dell.com)
System PowerEdge® 4300/400 Setup
BIOS Version: XXX
Keyboard Errors: Report
Boot Sequence: Diskette First
Scan Sequence: Slots First (H/L)
System Password: Not Enabled
Password Status: Unlocked
Setup Password: Not Enabled
Integrated Devices
Mouse: On
Serial Port 1: Auto
Serial Port 2: Auto
Parallel Port: 378h
Parallel Mode: PS/2
Diskette: Auto
Speaker: On
Primary SCSI: On
Secondary SCSI: On
This category sets whether keyboard-related error messages are reported at system startup. Changes take effect after reboot.
Pentium®II Processor 400 MHz
Level 2 Cache: 512 KB Integrated
System Memory: 64 MB ECC SDRAM
Video Memory: 2 MB SGRAM
Service Tag: XXXXX
Asset Tag: XXXXXXXXXX
Tab, Shift-Tab change fields
←, → change values
Alt-P next
Esc exit
Alt-B reboot

Figure A-1. System Setup Screens

Table A-1. System Setup Options

Option	Function
Time	Resets time on computer's internal clock.
Date	Resets date on computer's internal calendar.
Diskette Drive A **Diskette Drive B**	Identifies type of diskette drives installed. Tape drives are *not* reflected.
Reserved Memory	Allows a region of system board memory to be supplied by an expansion card with **15M - 16M** or **None** (default).
CPU Speed	Indicates the processor speed at which the system boots (can toggle to a lower speed). This option should be used only for trouble-shooting purposes; otherwise, do not use.
Num Lock	On 101- and 102-key keyboards, determines whether system boots with Num Lock activated (does not apply to 84-key keyboards).
Processor 1 **Processor 2**	Displays version or stepping number of the microprocessor in each processor slot on the system board.
Fan Speed	Sets the fan speed to **Full Speed** (default) or **Noise Reduced**.
System Alert	Sets the system LED to flash when a critical (**Fault**, the default) or noncritical (**Warning**) error threshold is passed.
Keyboard Errors	Enables or disables reporting of keyboard errors during POST.
Boot Sequence	Determines whether system boots from diskette (if present) or hard-disk drive.
Scan Sequence	Determines the order in which the PCI devices are scanned by the system.
System Password	Displays current status of system's password security feature. Also used to assign and verify a new password. The system password is overridden by the setup password.
Password Status	If set to **Locked**, prevents the system password from being changed or disabled. Requires that **Setup Password** option be set to **Enabled**.
Setup Password	Restricts access to System Setup program. The setup password overrides the system password.
Mouse	Enables or disables the built-in PS/2-compatible mouse port.

Table A-1. System Setup Options *(continued)*

Option	Function
Serial Port 1 **Serial Port 2**	Configures system's built-in serial ports. These options may be set to **Auto** (default) to automatically configure a port, to a specific designation (**COM1** [3F8h] or **COM3** [3E8h] for **Serial Port 1**; **COM2** [2F8h] or **COM4** [2E8h] for **Serial Port 2**), or to **Off**.
Parallel Port	Configures system's built-in parallel port. The port's I/O address may be set to **378h** (default), **278h**, **3BCh**, or to **Off** to disable the port.
Parallel Mode	Controls whether system's built-in parallel port acts as an AT-compatible (unidirectional) or PS/2-compatible (bidirectional) port.
Diskette	Controls operation of the system's built-in diskette controller.
Speaker	Determines whether the built-in speaker is **On** (default) or **Off**.
Primary SCSI **Secondary SCSI**	Turns the respective SCSI controllers on or off. Selecting **On** (default) enables a controller and allows scanning of the devices connected to it, allowing the device with the lowest SCSI ID to function as a boot device (unless a boot device connected to an enabled controller higher in the scan sequence has already been detected). Selecting **Off** causes the BIOS to mask the presence of a controller.
Processor field	Displays microprocessor type and speed.
Level 2 Cache	Displays size of integrated cache.
System Memory	Displays entire amount of installed memory detected in system, except for memory on EMS expansion cards.
Video Memory	Displays amount of video memory detected.
Service Tag	Displays system's five-character service tag number.
Asset Tag	Displays the asset tag number if one is assigned.

Index

B

back-panel features, 1-4

battery
  removal, 4-34

beep codes
  about, 3-1
  system, list of, 3-2

bezel
  removal, 4-4

boot routine
  observing when troubleshooting, 2-3

built-in SCSI host adapters, 1-2, 1-8

C

cables
  SCSI, 1-9

CD-ROM drive
  location, 1-4, 4-6
  removal, 4-9, 4-10

computer
  back/right side internal view, 1-5
  back-panel features, 1-4
  cover removal, 4-3
  front-panel indicators, 1-4
  orientation, 1-3
  technical specifications, 1-20

configuration guidelines
  SCSI drives, 1-9

configuration jumpers
  descriptions, 1-18
  locations, 1-15, 1-17

connectors
  DC power, 1-12
  locations, 1-15

control panel assembly
  removal, 4-5

D

DC power
  connectors, 1-12
  voltage ranges, 1-10

Dell Diagnostics, running, 2-6

Dell Remote Assistant Card. *See* DRAC

DIMMs
  about, 1-2
  ECC, 1-7
  installation, 4-30
  removal, 4-30
  socket population guidelines, 1-7

diskette drive
  location, 1-4, 4-6

DRAC, 1-2

DREQ line assignments
  list of, 1-19

drive access indicator, 1-4

drives
See also CD-ROM drive, diskette drive, SCSI devices
externally accessible drive bays, 1-4
location of, 4-6
SCSI configuration guidelines, 1-9
termination, 1-9

E

ECC, 1-7

expansion cards
about, 1-8
ISA, 1-8
PCI, 1-8
removal, 4-28
slots, 1-8

expansion subsystem, 1-8

external visual inspection, 2-2

externally accessible drive bays, 1-5

externally accessible drives, removal, 4-9, 4-10

F

front bezel
removal, 4-4

front panel
features, 1-4

G

guide-bracket assembly removal, 4-37

H

hard-disk drives, SCSI
carrier removal, 4-12
configurations, 1-8
ID numbers, 1-8
hard-disk drives, SCSI *(continued)*
indicators, 3-17
insert removal, 4-11
location, 4-6

help, getting, 2-7

I

I/O connections, 1-4

ID numbers for SCSI devices, 1-9

indicators
front panel, 1-4
hard-disk drive, 3-17

interrupt assignments
list of, 1-18

ISA expansion cards
about, 1-8

J

jumpers
descriptions, 1-18
location on system board, 1-17

K

keyboard
connector, 1-4

M

memory
system, 1-7

messages
beep codes, 3-1
SCSI hard-disk drive indicator codes, 3-17
system, 3-5

microprocessor
about, 1-20
guide bracket assembly, 4-37

microprocessor *(continued)*
removal, 4-31
speeds, 1-1
terminator cartridge, 4-33
upgrade kit, 1-2
mouse
connector location, 1-4

P

parallel port
connector location, 1-4
PCI expansion cards
about, 1-8
Plug and Play ISA expansion cards, 1-8
POST beep codes, 3-1
power indicator, 1-4
power supply
removal, 4-16, 4-17, 4-20
power switch, 1-4
power-supply paralleling board. *See* PSPB
precautionary measures, 4-2
PSPB, 1-11, 4-17, 4-21

R

resource conflicts, eliminating, 2-6

S

SCSI backplane board
about, 1-2, 1-8
SCSI configuration guidelines, 1-9
SCSI controller, integrated, 1-8
SCSI devices
ID numbers, 1-9
indicator codes, 3-17
termination, 1-9
SCSI hard-disk drives. *See* drives, SCSI devices
SCSI host adapters
integrated Adaptec AIC-7860, 1-2, 1-8
integrated Adaptec AIC-7890, 1-2, 1-8
SEC cartridge and heat sink removal, 4-31
serial ports
connector locations, 1-4
server management features, 1-2
single-edge contact cartridge. *See* SEC, 4-31
specifications, technical, 1-20
subsystems, advanced expansion, 1-8
system battery
removal, 4-34
system beep codes
list of, 3-2
system board
assembly, removal, 4-35
component locations, 1-15, 4-26
illustrated, 1-15
jumpers, 1-17
removal, 4-36
system features, 1-1
system memory, 1-7
system messages
list of, 3-5
System Setup program
about, A-1
menus, A-2

T

technical specifications, 1-20
termination
on SCSI devices, 1-9
terminator card removal, 4-33

troubleshooting
boot routine, observing, 2-3
external visual inspection, 2-2
initial user contact, 2-1
internal visual inspection, 2-5

U

user contact, initial, 2-1

V

video
subsystem, 1-2
video connector location, 1-4
video controller, integrated, 1-8
visual inspection
external, 2-2
internal, 2-5